3/1/06-00513

Final

Work Plan
Site 19 Removal Action

St. Juliens Creek Annex
Chesapeake, Virginia

Task Order 0059

March 2006

Prepared for

Department of the Navy
NAVFAC
Mid-Atlantic

Under the

AGVIQ/CH2M HILL JV I Program
Contract N62470-03-D-4401

Prepared by

AGVIQ
AGVIQ ENVIRONMENTAL SERVICES
CH2M HILL
JOINT VENTURE

Virginia Beach, Virginia

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Abbreviations and Acronyms

BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
ESS	Explosive Safety Submission
ft	feet
HSP	Health and Safety Plan
JV I	AGVIQ-CH2M HILL Joint Venture I
MEC	Munitions and Explosives of Concern
MPPEH	Material Potentially Presenting an Explosive Hazard
NAPEC	Naval Ammunition Production Engineering Center
NAVFAC	Naval Facilities Engineering Command
NEESA	Naval Engineering and Environmental Support
NFA	No Further Action
NOSSA	Naval Ordnance Safety and Security Activity
PAH	Polycyclic Aromatic Hydrocarbon
RBC	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
ROICC	Resident Officer in Charge of Construction
SIMA	Shore Intermediate Maintenance Activity
SJCA	St. Juliens Creek Annex
SPAWAR	Space and Naval Warfare Systems Command
SVOC	Semivolatile Organic Compound
TCLP	Toxicity Characteristic Leachate Procedure
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
UTL	upper threshold limit
VOC	Volatile Organic Compound
VSWMR	Virginia Solid Waste Management Regulations

SECTION 1

Introduction

AGVIQ-CH2M HILL Joint Venture I (JV I) has been contracted by the United States Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic to provide environmental remediation services at Site 19 at St. Juliens Creek Annex (SJCA), Chesapeake, Virginia. This work will be performed under the terms and conditions of the existing fixed-price contract, N62470-03-D-4401, Task Order 0059.

This work plan is organized into five sections: this section provides report organization and background information. Section 2 summarizes the objectives and the scope of work for the Site 19 removal action, and Section 3 provides task-specific descriptions of the planned remedial activities. Section 4 provides the quality control plan for the project. Tables and figures are located at the end of each section. The appendixes include the following:

A Health and Safety Plan (HSP)
B Quality Control Plan
C Explosive Safety Submission (ESS) Waiver Documentation
D Munitions and Explosives of Concern (MEC) Construction Support and Management Plan
E MEC Notification Procedures
F Environmental Protection Plan

1.1 Base Background

The SJCA facility, covering approximately 490 acres, is located at the confluence of St. Juliens Creek and the Southern Branch of the Elizabeth River, in the City of Chesapeake in southeastern Virginia (Figure 1-1).

The facility is bordered to the north by the Norfolk and Western Railroad, the City of Portsmouth, and residential areas; to the west by residential areas; to the south by St. Juliens Creek; and to the east by the Southern Branch of the Elizabeth River. The Norfolk Naval Shipyard is roughly 1 mile north. Most surrounding areas are developed and include residences, schools, recreational areas, and shipping facilities for several large industries.

St. Juliens Creek Annex began operations as a naval ammunition facility in 1849. Past operations at SJCA have included general ordnance operations involving wartime transfer of ammunitions to various other Naval facilities throughout the United States and abroad. SJCA has also been involved in specific ordnance operations including those involving black powder, smokeless powder, projectile-loading, mine-loading, tracer-mixing, testing, and decontamination. All ordnance-related activities at SJCA have been discontinued.

St. Juliens Creek Annex has also been involved in nonordnance operations and shops, including degreasing operations, paint shops, machine shops, vehicle and locomotive maintenance shops, pest control shops, battery shops, print shops, electrical shops, boiler plant operations, wash-rack operations, potable and saltwater fire-protection systems, fire-training operations, and the storage of oils and chemicals.

Activity at SJCA has decreased in recent years. SJCA's current primary mission is to provide a radar-testing range and various administrative and warehousing facilities for nearby Norfolk Naval Shipyard and other local naval activities. St. Juliens Creek Annex also provides administrative offices, light industrial shops, , Space and Naval Warfare Systems (SPAWAR)Command facilities, , a cryogenics school, and storage facilities; including Defense Reutilization and Marketing Office (DRMO) and Mid-Atlantic Regional Maintenance Center (MARMC).

1.2 Site 19 Background

Site 19 consists of former Building 190 and the surrounding area. Building 190 was located just south of the mouth of Blows Creek at the confluence of the Southern Branch of the Elizabeth River (Figure 1-2). The building was heavily used for loading explosives, including Explosive D and Composition A-3, into ammunition from the 1940s to the 1970s.

In mid-1977, all ordnance-handling buildings were decontaminated by flushing with chemical solutions and water. Prior to decontamination, Naval Ammunition Production Engineering Center (NAPEC) visually inspected the facilities and collected samples for chemical analysis to develop appropriate decontamination procedures for each building. At the conclusion of the decontamination process, NAPEC visually reinspected each building, collected samples for chemical analysis, and certified that the facilities were decontaminated. However, since the level of decontamination was not specified, there remained a potential for ordnance residues.

The 1989 Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) reported that various ordnance items had been disposed of in the area between Building M-5 and Building 190 during past ordnance management activities (Figure 2-3). The area was noted to contain a variety of construction rubble and facility personnel reported no knowledge of residual contamination from ordnance management operations.

Building 190 was demolished sometime after 2000 and the site is now a grass-covered field. Two concrete drainage culverts remain on site, leading underground from former Building 190 to the Southern Branch of the Elizabeth River.

1.3 Previous Studies

A number of studies and investigations have been completed at SJCA and Site 19. The following reference documents provide detailed descriptions of the site conditions, proposed removal alternatives, and the selected remedy:

- "Navy Assessment and Control of Installation Pollutants: Initial Assessment Study of St. Juliens Creek Annex, Norfolk Naval Shipyard, Portsmouth, Virginia," *NEESA 13-001*, August 1981
- "Phase II RCRA Facility Assessment of the St. Juliens Creek Annex Facility, Chesapeake, Virginia," A.T. Kearney, Inc. and K.W. Brown and Associates, Inc., March 1989
- "Final Relative Risk Ranking System Data Collection Report, St. Juliens Creek Annex to the Norfolk Naval Base, Chesapeake, Virginia," CH2M HILL, April 1996

- "Final Background Investigation Report, St. Juliens Creek Annex, Chesapeake, Virginia," CH2M HILL, October 2001
- "Final Site Screening Assessment Report, St. Juliens Creek Annex, Chesapeake, Virginia," CH2M HILL, April 2002
- "Final Site Investigation at Sites 8, 19, 21, and AOC 1, St. Juliens Creek Annex, Chesapeake, Virginia," CH2M HILL, June 2004
- "Final Supplemental Site Investigation Report for Site 19, St. Juliens Creek Annex, Chesapeake, Virginia," CH2M HILL, September 2005
- "Final Engineering Evaluation/Cost Analysis, Site 19, St. Juliens Creek Annex, Chesapeake, Virginia," CH2M HILL, November 2005

During the Supplemental Site Investigation, a Metallic Slag Area and Elevated Subsurface Polycyclic Aromatic Hydrocarbons (PAHs) Area were identified as the sites areas of concern. Samples were collected and analyzed in order to delineate the areas (Figure 1-3). Based on the comparative analysis conducted as part of the Engineering Evaluation/Cost Analysis (EE/CA), excavation and backfill of the Metallic Slag Area and Elevated Subsurface PAHs Area was selected as the recommended removal alternative for Site 19. Excavation and backfill will eliminate potential unacceptable risk to human health and the environment posed by elevated PAH concentrations detected in subsurface soils in the Elevated Subsurface PAHs Area and elevated metals in surface soil in the Metallic Slag Area. The excavation and backfill will also prepare the site for closeout under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) with No Further Action (NFA).

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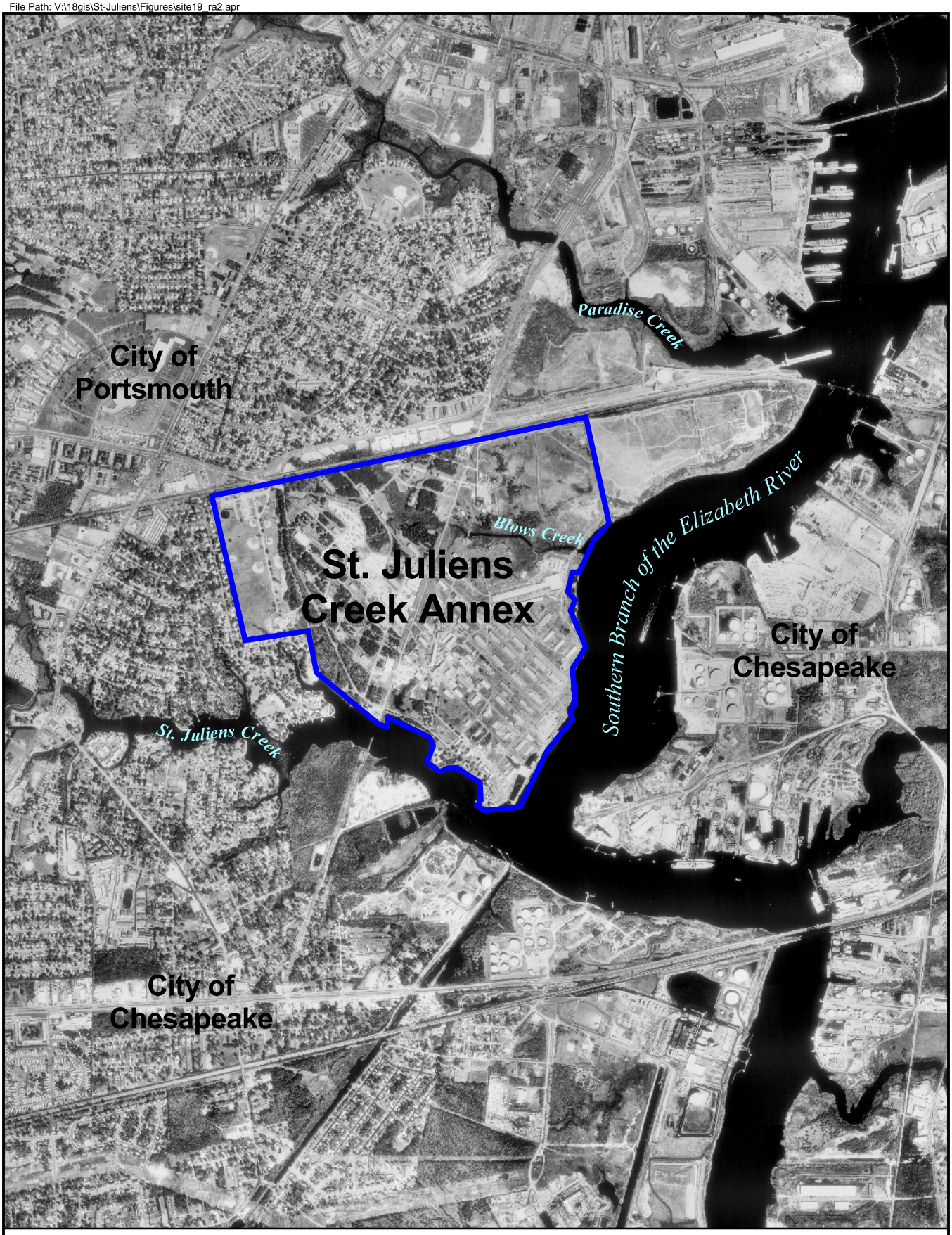

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St. Juliens Creek Annex

N

0 1000 2000 3000 Feet

Figure 1-1
Location of St. Juliens Creek Annex
Work Plan - Site 19 Removal Action
St. Juliens Creek Annex
Chesapeake, Virginia

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Site Location

Facility Boundary

N

0 500 1000 1500 Feet

Figure 1-2
Location of Site 19
Work Plan - Site 19 Removal Action
St. Juliens Creek Annex
Chesapeake, Virginia

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LEGEND

- SI Surface Soil Sample Location
- SI Subsurface Soil Sample Location
- SSI Surface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Extent of PAH Removal (Area = 1,084 sq.ft.)
- Extent of Metallic Slag Removal (Area = 2,866 sq.ft.)
- Site Boundary

N

0 35 70 Feet

Figure 1-3
Site 19 Removal Areas
Work Plan - Site 19 Removal Action
St. Juliens Creek Annex
Chesapeake, Virginia

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SECTION 2

Objectives and Scope of Work

This Task Order has been issued to implement a removal action at Site 19. Site 19 consists of two areas of concern: Metallic Slag Area and Elevated Subsurface PAHs Area (Figure 1-3).

The objectives of the scope of work for Task Order 0059 are to:

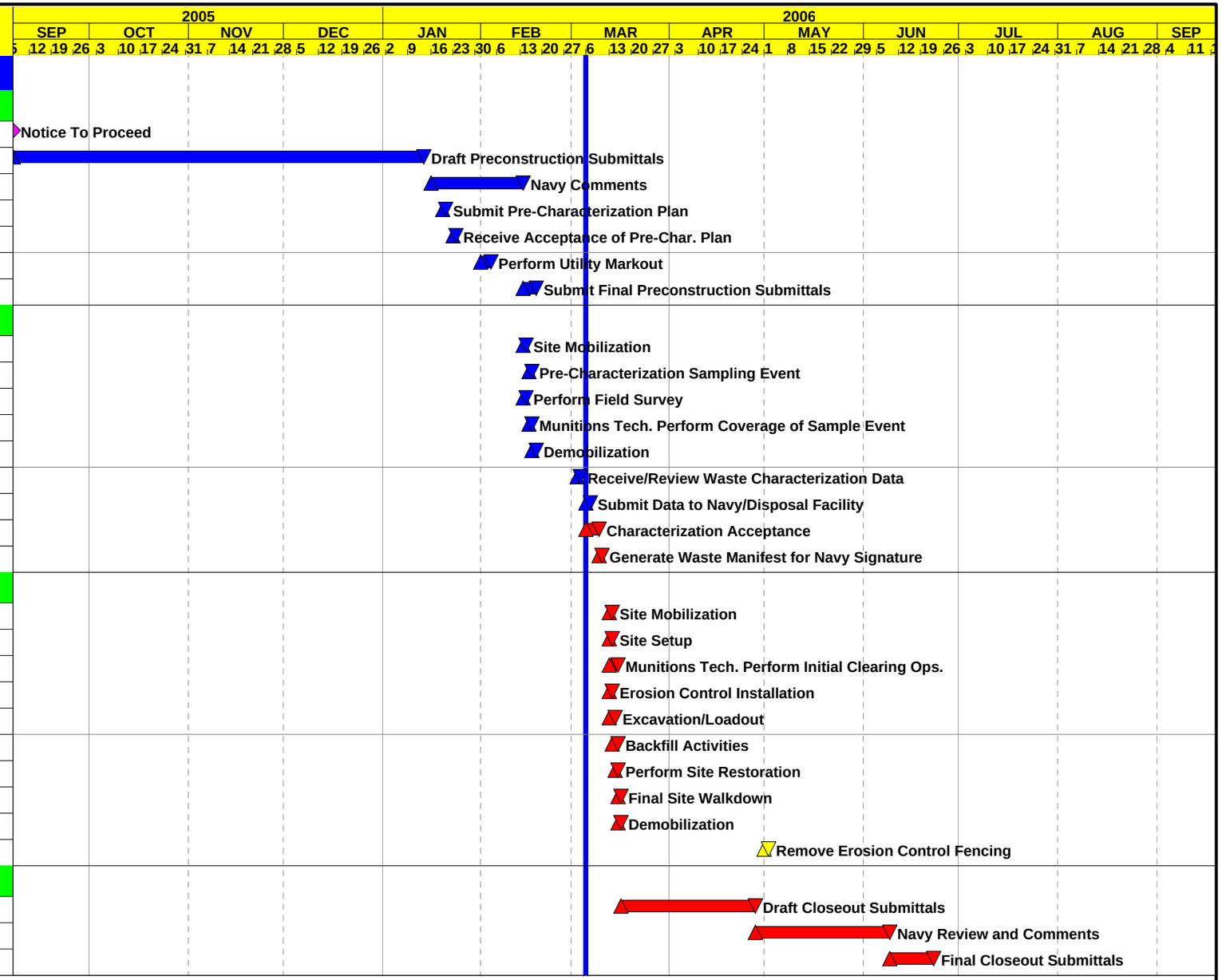
- Conduct waste characterization sampling to obtain representative chemical analysis for use in selecting an appropriate disposal facility
- Excavate soil from the Metallic Slag Area
- Excavate soil from the Elevated Subsurface PAHs Area
- Dispose of the excavated materials at a qualified waste disposal facility in accordance with state and federal regulations
- Backfill the excavations and restore the site

All activities associated with the scope of services for this Task Order will be conducted in a safe, compliant, and expeditious manner and in accordance with the HSP (Appendix A). The following key activities are included in the scope of work for the Removal Action:

- Premobilization coordination
- Mobilization and site preparation
- Excavation
- Transportation and disposal of excavated materials
- Backfill and site restoration
- Cleanup and demobilization
- Closeout documentation

The quality of the above activities will be ensured through implementation of the Quality Control Plan (Appendix B). The actual execution of the individual tasks will be preplanned and continually adjusted to overlap durations of specific activities and perform other tasks consecutively to maximize the availability and utilization of onsite resources. The proposed project schedule is presented on Figure 2-1.

Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
CTO 59 - Site 19 Removal Action					
Premobilization Activities					
Notice To Proceed	0	0	100	07SEP05A	
Draft Preconstruction Submittals	93	0	100	07SEP05A	13JAN06A
Navy Comments	21	0	100	16JAN06A	13FEB06A
Submit Pre-Characterization Plan	1	0	100	20JAN06A	20JAN06A
Receive Acceptance of Pre-Char. Plan	1	0	100	23JAN06A	23JAN06A
Perform Utility Markout	3	0	100	01FEB06A	03FEB06A
Submit Final Preconstruction Submittals	4	0	100	14FEB06A	17FEB06A
Phase 1					
Site Mobilization	1	0	100	14FEB06A	14FEB06A
Pre-Characterization Sampling Event	1	0	100	16FEB06A	16FEB06A
Perform Field Survey	1	0	100	14FEB06A	14FEB06A
Munitions Tech. Perform Coverage of Sample Event	1	0	100	16FEB06A	16FEB06A
Demobilization	1	0	100	17FEB06A	17FEB06A
Receive/Review Waste Characterization Data	1	0	100	03MAR06A	03MAR06A
Submit Data to Navy/Disposal Facility	1	0	100	06MAR06A	06MAR06A
Characterization Acceptance	4	4	0	06MAR06	09MAR06
Generate Waste Manifest for Navy Signature	1	1	0	10MAR06	10MAR06
Phase 2					
Site Mobilization	1	1	0	13MAR06	13MAR06
Site Setup	1	1	0	13MAR06	13MAR06
Munitions Tech. Perform Initial Clearing Ops.	3	3	0	13MAR06	15MAR06
Erosion Control Installation	1	1	0	13MAR06	13MAR06
Excavation/Loadout	2	2	0	13MAR06	14MAR06
Backfill Activities	2	2	0	14MAR06	15MAR06
Perform Site Restoration	1	1	0	15MAR06	15MAR06
Final Site Walkdown	1	1	0	16MAR06	16MAR06
Demobilization	1	1	0	16MAR06	16MAR06
Remove Erosion Control Fencing	1	1	0	01MAY06	01MAY06
Reporting and Administration					
Draft Closeout Submittals	30	30	0	17MAR06	27APR06
Navy Review and Comments	30	30	0	28APR06	08JUN06
Final Closeout Submittals	10	10	0	09JUN06	22JUN06



Start Date	28MAR05
Finish Date	22JUN06
Data Date	06MAR06
Run Date	06MAR06 09:41

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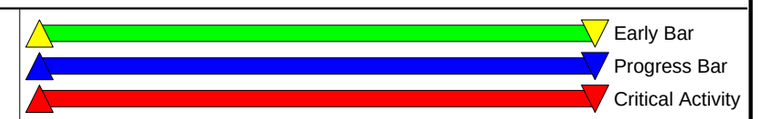
Figure 2-1
Project Schedule
Site 19-Removal Action



SECTION 3

Description of Activities

3.1 Premobilization Coordination

To enhance the timely mobilization of JV I resources and subcontractors to meet operational schedule commitments, premobilization activities will begin immediately upon notification that the Site 19 Action Memorandum has been submitted for approval. These premobilization activities are discussed below.

3.1.1 Utility Search

Underground utilities have been identified by utility locators within Site 19; however, no known utilities are currently identified within the excavation areas. There are no overhead power lines.

All excavation areas will be addressed in accordance with COMNAVREG MIDLANT Instruction 11300.1 and cleared by local utility operators through the Virginia Utility Protection Services, Inc. (Miss Utility of Virginia) notification system. JV I will request a utility mark-out prior to beginning the waste characterization sampling and soil excavation activities. JV I will supply the Navy with a drawing outlining the work area at least 1 week prior to planned field activities. A field inspection to verify the locations of utilities will be conducted to prepare the site for all subsequent removal operations. An independent utility locator service will be subcontracted to perform a utility search within the excavation areas prior to any intrusive activities.

3.1.2 Haul Route Review

JV I staff will predetermine truck delivery and egress routes to minimize congestion and facilitate loading and offloading operations. Prior to finalizing the vehicle routes, pre-existing conditions will be reviewed and documented. The truck route will be documented, including all deficiencies and surfaces in need of repair, by photograph in the preconstruction survey. The proposed vehicle route (Figure 3-1) will be driven by qualified JV I personnel as a final confirmation to also ensure that no weight limitations exist over any crossings or culverts. The final site haul route will be posted and clearly marked for hauling vehicles entering and exiting the site and approved by the Resident Officer in Charge of Construction (ROICC).

3.1.3 Preconstruction ROICC Conference

Prior to the proposed mobilization date for field activities, coordination with the Norfolk Naval Shipyard ROICC office will identify the date, time, and location for the preconstruction conference (Precon). JV I representatives will attend the Precon along with Base fire, security, safety, environmental and NAVFAC Mid-Atlantic personnel; ROICC and construction representatives; and any other invited project "stakeholders." JV I attendees will be prepared to respond to questions as well as to present an overview of the project

scope, schedule, planned invoicing, health and safety concerns, quality control procedures, and any site logistical issues. This meeting will take place prior to mobilization for the construction efforts.

3.1.4 Procurement/Vendor Sourcing

Upon receipt of the Navy's notice to proceed, the JV I financial team will source and procure services, materials, and equipment required for the execution of the scope of work. To support this effort, the JV I Project Manager will generate a procurement schedule that will "timeline" each individual procurement item for the entire project duration. Pertinent information on each item will be included in the procurement schedule (i.e., deliverable deadline, quantity, duration). The procurement schedule will also sequence each procurement in the consecutive order and time it is required for delivery at the project location.

3.2 Mobilization and Site Preparation

3.2.1 Munitions and Explosives of Concern (MEC) Construction Support

There is no documented history of ordnance disposal at Site 19; however, due to the operational nature of former Building 190 and SJCA, there is the potential for encountering Material Potentially Presenting an Explosive Hazard (MPPEH) at the site. NAVFAC Mid-Atlantic submitted an Explosive Safety Submission (ESS) Waiver Request to Naval Ordnance Safety and Security Activity (NOSSA) on June 2, 2005 to seek approval for an exemption of the ESS requirement for MEC avoidance activities at Site 19. On August 12, 2005, NOSSA provided a letter accepting the waiver for Site 19. The ESS waiver documentation outlines the general field approach and is provided in Appendix C.

A two person team of MEC support personnel will be subcontracted to provide construction support for all intrusive activities at Site 19, including waste characterization sampling and excavation. The MEC support contractor has prepared a MEC Support and Construction Management Plan (Appendix D) in compliance with the NOSSA ESS Waiver Request response (Appendix C) providing specific MEC support procedures. In addition, activity-specific information is provided in the following sections. The senior MEC support technician (Tech III) directly controls any intrusive activities in order to achieve maximum operational safety and efficiency. The MEC support team will implement the approved MEC Support and Management Plan (Appendix D) in the field and review any changes proposed to the approved plan. The MEC support team can temporarily stop work in order to correct unsafe conditions or procedures.

During all intrusive activities, only the onsite MEC support team will have the ability to determine whether a found item is considered live or inert. If the item is determined to be inert, it will be stored onsite in a secured area until transferred to DRMO or a scrap metal facility identified by DRMO that is part of the qualified recycling program. If the MEC support team cannot make a determination regarding the found item or if the item is determined to be potentially live, procedures (Appendix E) have been designed to effectively communicate the finding of potentially live MEC. Communicating in a fast, accurate, and calm manner is critical in keeping the situation under control.

3.2.2 Waste Characterization Sampling

Upon completion of the utility verification, waste characterization samples will be collected from the Metallic Slag Area and Elevated Subsurface PAHs Area to obtain analytical information for disposal acceptance. MEC avoidance will be practiced during the sampling event. Materials disposed off-site will be managed in accordance with Virginia Solid Waste Management Regulations (VSWMR). This activity will occur after the draft preconstruction documents (work plan) have been submitted and prior to construction mobilization. This will allow work to proceed upon mobilization without delay for analytical testing and results.

One composite waste characterization sample will be collected from each of the excavation areas. The samples will be collected from 0 to 1.5 feet below ground surface (bgs) in the Metallic Slag Area and from 0 to 4 feet bgs in the Elevated Subsurface PAHs Area for full Toxicity Characteristic Leachate Procedure (TCLP) analysis. The TCLP analysis will include: TCLP volatile organic compounds (VOCs), TCLP semivolatile organic compounds (SVOCs), TCLP metals, TCLP pesticides and TCLP herbicides. Additional analysis may be run if required by the disposal facility. TCLP testing will be run in accordance with 40CFR261.24.

3.2.3 Mobilization and Site Set Up

Construction personnel, equipment, and materials will be mobilized to the site at the rates necessary to complete the project per the statement of work and schedule. Initially, a support area will be prepared and key individuals and equipment will be mobilized to the site to prepare for and receive the equipment essential to complete the project activities. Materials and equipment necessary for implementation of the Environmental Protection Plan (Appendix F) will be brought to the site in order to ensure the removal action activities do not impact the surrounding area. Additional personnel and equipment will be mobilized to the site as dictated by task resource demands, and subsequently released from the project when their work assignments are completed.

Once initial mobilization and site set up have been completed, site preparation activities will begin. A stabilized construction entrance will be incorporated into the existing Site 19 access road. The entrance will be constructed in a manner as to contain dislodged material and tire cleaning activities will be initiated as necessary to prevent the tracking of mud, dirt, or sediment onto the facility road surfaces.

The installation of support facilities will include the delivery of sanitation facilities, a generator, and portable water storage units. Due to the short duration of the project, an on-site trailer will not be used.

3.2.4 Erosion and Sediment Control Installation

Virginia's Erosion and Sediment Control Program does not regulate land disturbing activities that disturb less than 10,000 square feet. Because the combined area of the Metallic Slag Area and the Elevated Subsurface PAHs Area is 3,950 square feet, an Erosion and Sediment Control Plan is not required for this site. However, temporary erosion control measures will be implemented at the site, including silt fence around the disturbed areas until vegetation is reestablished, a stabilized construction entrance, and temporary seeding

of areas that will remain disturbed for 30 days prior to permanent seeding. Permanent erosion control for the site consists of permanent seeding with a native seed mixture.

All erosion and sediment controls will be established, inspected, and maintained in accordance with the *Virginia Erosion and Sediment Control Handbook*.

3.2.5 Work Zone Delineation

Work zones will be established to delineate support areas and restricted access areas and to ensure appropriate health and safety zones for workers and base personnel. The JV I will strategically locate high visibility fencing, signs, and traffic cones to identify work zones, traffic routes, and lanes for the hauling vehicles.

3.2.6 Spill Prevention

To minimize the potential for spills and or releases from stationary fuel tanks, heavy equipment, and trucks, visual inspections will be performed periodically throughout the work shift for signs of drips, leaks, or stains on ground surfaces on and below the equipment. A fueling station will be pre-designated in an area that will have the ground surface protected in the event of a leak or spill from overfilling. JV I will utilize a fuel vendor to deliver fuel and dispense directly into the equipment.

JV I will provide adequate spill response equipment and materials. Spill response equipment will include absorbent materials, sand, and other spill-containment devices necessary to prevent spill migration. Other equipment will include construction equipment used in ongoing construction activities.

All equipment will be tested and maintained as necessary to assure its proper operation in time of emergency. After an emergency, all equipment will be cleaned and ready for its intended use before normal operations resume.

3.3 Excavation

The excavation limits of each area were previously determined during the Supplemental Site Investigation (CH2M HILL, September 2005). The Metallic Slag Area is approximately 2,866 ft^2 and extends to a depth of 1.5 feet (Figure 3-2). The Elevated Subsurface PAHs Area is approximately 1,084 ft^2 and extends to a depth of 4 feet (Figure 3-3). The Elevated Subsurface PAHs Area excavation will be sloped to ensure a safe and stable excavation. Prior to excavation, the areas will be marked in the field through the use of a global positioning system.

In accordance with the ESS Waiver and MEC Construction Support and Management Plan, prior to the start of excavation, the MEC support team will visually inspect the ground surface and scan the area with magnetometers. Excavation will be performed by a tracked excavator, which will mechanically remove the soils for disposal in six-inch to one-foot lifts. The MEC support personnel will continuously observe the excavation process and scan each lift of the excavation both visually and mechanically. Excavated material will be placed directly into haul vehicles for transportation to the off-site disposal facility. Each haul vehicle will be filled to less than the maximum hauling capacity to avoid spillage. Flagmen will direct and receive the hauling vehicles via predetermined travel routes.

In the event of extremely dry conditions, JV I technicians will implement dust control measures to minimize visible dust emissions from wind blown sediments and will implement street sweepers to removed soils from haul route.

3.4 Transportation and Disposal of Excavated Materials

Excavated materials will be disposed of offsite at an approved disposal facility. A subcontractor will be retained to transport and dispose of the excavated Site 19 materials. Proper shipping papers will be completed for each load and the appropriate copies will accompany each load. Non-hazardous waste manifests will be signed by the NAVFAC Mid-Atlantic project manager, Ms. Agnes Sullivan. Trucks will be inspected by JV I personnel prior to leaving the site to ensure that no loose material will be transferred onto facility roads.

3.5 Backfill and Site Restoration

3.5.1 Placement of Backfill

After confirming the excavation limits have been achieved, JV I will confer with the Navy representative to begin backfilling operations. Backfill will be delivered to the site from an off-site source that has been sampled to determine the quality of chemical properties, Backfill material will be certified clean through analytical testing for VOCs, SVOCs, pesticides/polychlorinated biphenyls, and inorganics and comparison to United States Environmental Protection Agency (USEPA) Risk-Based Concentrations (RBCs) and SJCA dredge fill background upper threshold limits (UTLs) (CH2M HILL, October 2001). Additional, borrow material will contain less than 50 milligrams per kilogram total petroleum hydrocarbons (TPH) and less than 10 milligrams per kilogram total benzene, toluene, ethylbenzene, and xylene (BTEX). Backfill material will consist of general fill and topsoil. General fill will be used to fill the excavations to within six inches of surrounding grade and topsoil will be used for the final six inches. General fill will be placed in the excavation in six- to eight-inch lifts and compacted by a minimum of four passes of the placing equipment until pumping of the ground no longer occurs with each additional pass, or by a similar compaction method. Topsoil compaction will be incidental to its placement.

3.5.2 Site Restoration

Once the site has been restored to its pre-excavation grade, seed, and mulch will be applied to all disturbed areas within the site limits. JV I will apply the seed, mulch, and nutrients consistent with the native and existing grasses.

3.6 Cleanup and Demobilization

JV I and Navy personnel will conduct a site inspection prior to the site's tear-down and demobilization. This inspection will focus on items that have been performed or will be performed prior to project completion. Items that are incomplete or require further work to meet the project specification will be documented and corrected by the project team within a reasonable time. Once the project has been completed, the Navy will be advised in writing

and a final inspection will be conducted involving the same personnel to verify that the items in question have been completed.

Once the final inspection is complete and the work is accepted, JV I will commence demobilizing personnel and equipment. Materials used during the performance of site activities will be removed and or disposed of.

3.7 Closeout Documentation

At the conclusion of field activities, JV I will commence preparation of the construction closeout report. This report will summarize all of the project activities. This report will include the following:

- Description of activities completed
- Description of variations from the original scope of work
- Transportation and disposal records
- Health and safety summary
- Analytical results and sample locations
- Color photograph log
- Final cost data

Each deliverable will be submitted to NAVFAC in hard copy form and on CD-ROM containing native files for each draft submittal and native and Adobe PDF files of each final submittal. Final versions will include the draft document, comments, response to comments, final document, final regulatory concurrence, and other relative information that should be included in the administrative record file.

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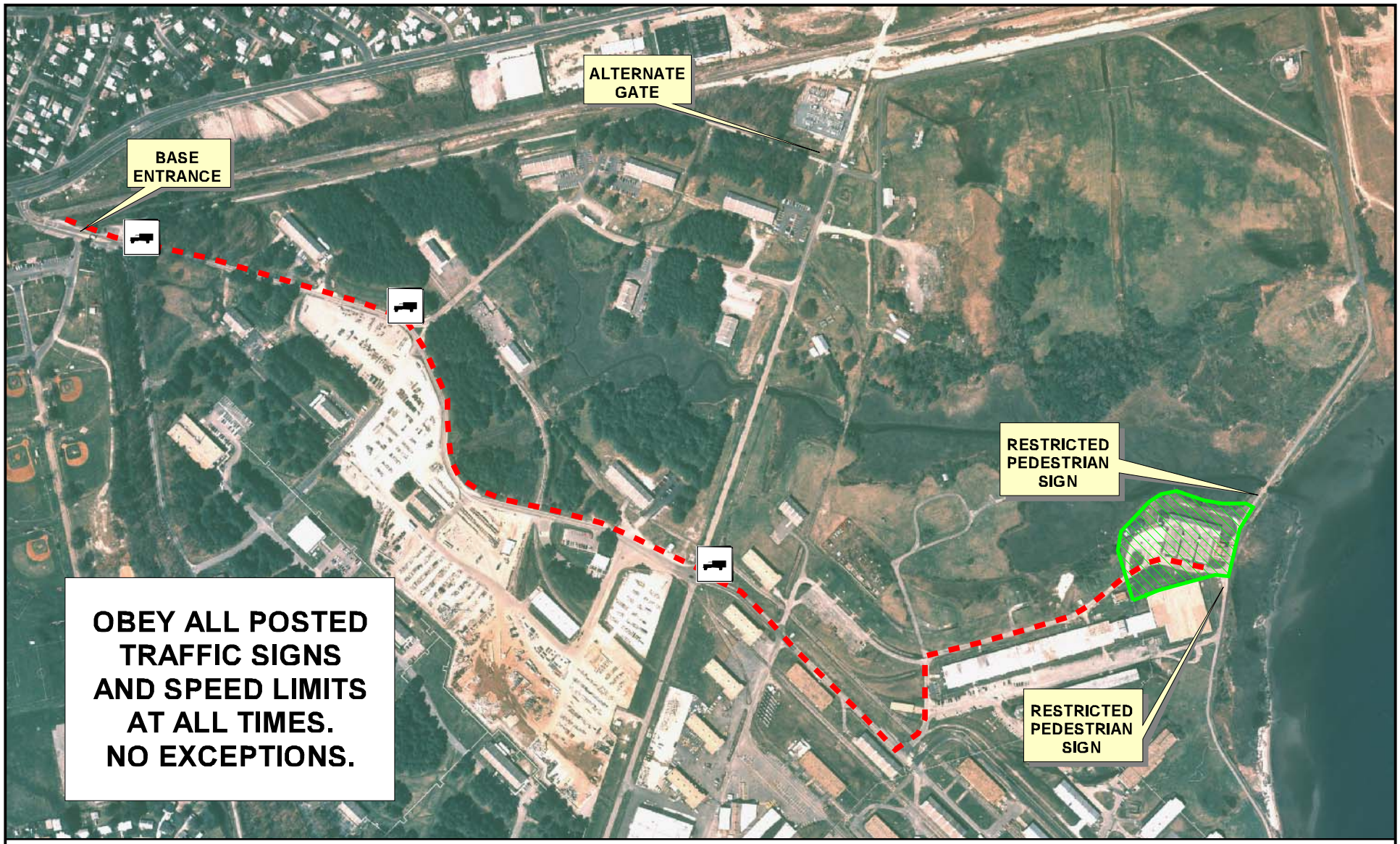

LEGEND

- Truck Route Signs
- Truck Route
- Site 19

N

0 400 800 Feet

Figure 3-1
Truck Route
Work Plan - Site 19 Removal Action
St. Juliens Creek Annex
Chesapeake, Virginia

AGVIQ-CH2M HILL JVI

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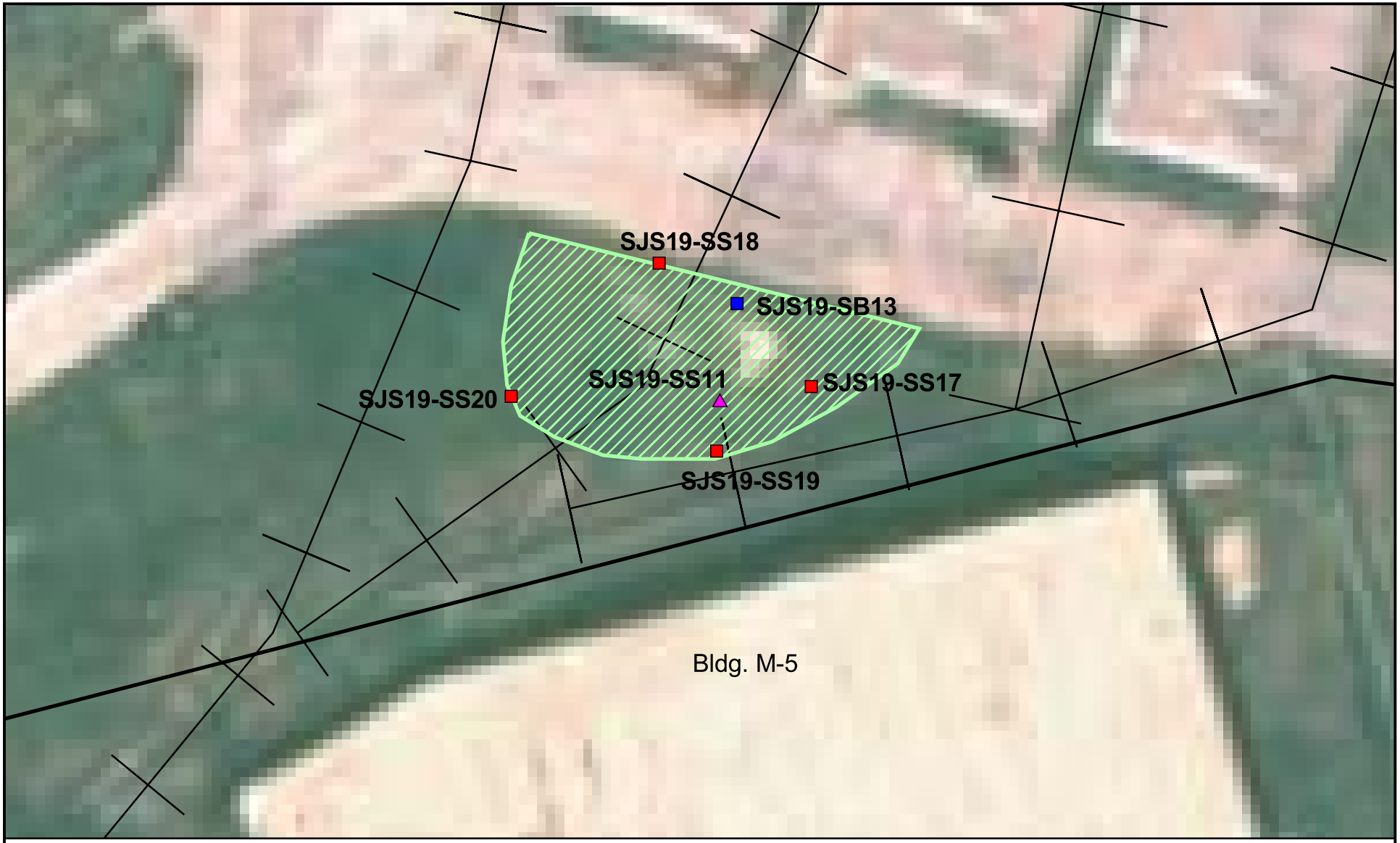

LEGEND

- SI Surface Soil Sample Location
- SSI Surface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Extent of Metallic Slag Removal (Area = 2,866 sq.ft.)
- Site Boundary

N

0 15 30 Feet

Figure 3-2
Metallic Slag Area
Limits of Excavation
Work Plan - Site 19 Removal Action
St. Juliens Creek Annex
Chesapeake, Virginia

AGVIQ-CH2M HILL JVI

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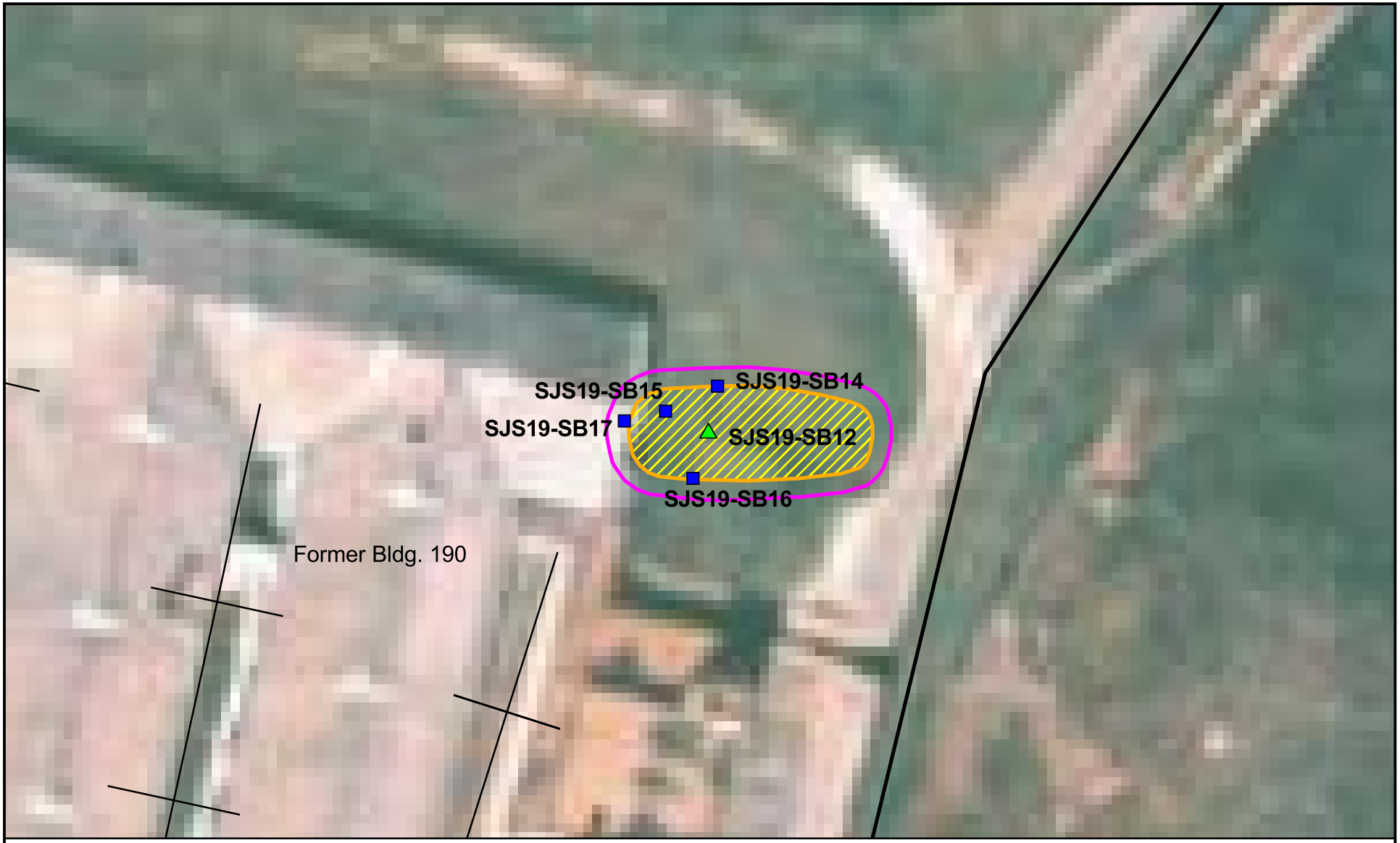

LEGEND

- SI Subsurface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Elevated Subsurface PAHs Area (Area = 1,084 sq. ft)
- Limits of Excavation
- Site Boundary

N

0 15 30 Feet

Figure 3-3
Elevated Subsurface PAHs Area
Limits of Excavation
Work Plan - Site 19 Removal Action
St. Juliens Creek Annex
Chesapeake, Virginia

AGVIQ-CH2M HILL JVI

Appendix A
Health and Safety Plan

Health and Safety Plan
Hot Spot Removal, Site 19

St. Juliens Creek Annex
Chesapeake, VA

Contract No: N62470-03-D-4401
Contract Task Order 059

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

AGVIQ — CH2M HILL
Joint Venture

March 2006

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1 Employee Signoff Form
2 Subcontractor H&S Tracking Form
3 Project H&S Forms/Permits
4 Project Activity Self-Assessment Checklists
5 Drug Free Work Place Program
6 Material Safety Data Sheets
7 Chemical-Specific Training Form
8 Project-Specific Hazard Communication Form and Other Pertinent Information
9 Biological Hazard Fact Sheet
10 Activity Hazard Analyses (AHAs)
11 Pre-Task Safety Plan (PTSP)
12 Safe Worker Observation (SWO) Form
13 Loss/Near Loss Incident Report Form
14 Emergency Contact List
15 Site Specific Accident Prevention Plan
16 COMNAVREG MIDLANT Instruction 11300
17 NAVY Mid-Atlantic Fire Prevention Procedures and Requirements

Acronyms and Abbreviations

AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
BBLPS	Behavior Based Loss Prevention System
bgs	below ground surface
CPR	cardiopulmonary resuscitation
dB	Decibels
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
ESS	Explosive Safety Submission
FA	First Aid
FID	flame ionization detector
Ft, ft^2	Feet, square feet
FUDS	Formerly used defense sites
GPR	Ground penetrating radar
GFCI	ground fault circuit interrupter
H&S	health and safety
HAZWOPER	Hazard Waste Operations
HR	heart rate
HSM	Health and Safety Manager
HSO	Health and Safety Officer
HSP	Health and Safety Plan
IRF	Incident Report Form
JV I	AGVIQ-CH2M HILL Joint Venture I
KA	Contracts Administrator
kV	kilovolts
lbs	pounds
MEC	Munitions and Explosives of Concern
MSDS	Material Safety Data Sheet
NAPEC	Naval Ammunition Production Engineering Center
NAVFAC	Naval Facilities Engineering Command
NLI	Near Loss Investigation
NSC	National Safety Council
NTR	Navy Technical Representative
PAH	Polycyclic Aromatic Hydrocarbon

PID	photoionization detector
PPE	Personal Protective Equipment
PTSP	Pre-Task Safety Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RF	Radio Frequency
RFI	RCRA Facility Investigation
RMSF	Rocky Mountain Spotted Fever
ROICC	Resident Officer in Charge of Construction
SJCA	St. Juliens Creek Annex
SOP	Standard of Practice
SSC	Site Safety Coordinator
SWO	Safe Work Observation
UL	Underwriters Laboratories
VDEQ	Virginia Department of Environmental Quality

1.0 Introduction

The AGVIQ-CH2M HILL Joint Venture I (JV I) has been contracted by the United States Navy, Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic Division, to provide environmental remediation services at St. Juliens Creek Annex (SJCA) in Chesapeake, VA. This work will be performed under the terms and conditions Contract Number N62470-03-D-4401, Task Order 059.

All site personnel, including JV I and subcontractors must review, or be briefed, on the contents this Health and Safety Plan (HSP) and sign the Employee Signoff Form (Attachment 1). In addition, the Health and Safety Officer (HSO), or authorized designee, will provide a safety briefing for all visitors to the site.

1.1 Base Background

SJCA is located in southeastern Virginia at the confluence of St. Julien's Creek and the Southern Branch of the Elizabeth River in the city of Chesapeake. The northern boundary of the annex is the boundary between the cities of Portsmouth and Chesapeake, Virginia. The Elizabeth River and St. Julien's Creek form the eastern and southern boundaries, respectively, of the annex. Also to the north are residential developments and a road bed of the Norfolk and Western Railroad, and to the south lie sewage disposal and industrial waste ponds and residential developments. A residential section of Chesapeake City abuts the annex on the west. Norfolk Naval Shipyard is located less than one mile to the north. SJCA occupies approximately 490 acres, including 407 acres of land, 14 acres of marsh, and 69 acres of surface water.

SJCA began operations in 1849 as an ordnance and material storage facility. In 1898, the facility was equipped for assembling ammunition. From 1898 to 1970, the facility was used to supply ammunition to the fleet in addition to loading, assembling, issuing, and receiving naval gun ammunition, and conducting experimental and test loading for new ammunition. Ordnance operations at the facility were terminated in the 1970s. SJCA currently provides administrative offices, light industrial shops, and storage facilities for tenant naval commands. Its primary mission is to provide a radar testing range and various administrative and warehousing structures.

1.2 Site Background

Site 19 consists of former Building 190 and the surrounding area. Building 190 was located just south of the mouth of Blows Creek at the convergence of the Southern Branch of the Elizabeth River and Blows Creek. The building was used for loading explosives into ammunition. From the 1940s to the 1970s, Explosive D and Composition A-3 were reportedly used.

In mid-1977, ordnance handling buildings were decontaminated by flushing with chemical solutions and water. Prior to decontamination, Naval Ammunition Production Engineering

Center (NAPEC) visually inspected the facilities and collected samples for chemical analysis to develop appropriate decontamination procedures for each building. At the conclusion of the decontamination process, NAPEC visually re-inspected each building, collected samples for chemical analysis and certified that the facilities were decontaminated.

The 1989 Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) reported that various ordnance items had been disposed of in the area between Building M-5 and Building 190 during past ordnance management activities. The area was noted to contain a variety of construction rubble and facility personnel reported no knowledge of residual contamination from management operations.

Building 190 was demolished sometime after 2000 and the site is now a grass covered field. Two concrete drainage culverts remain on-site, leading underground from former Building 190 to the Southern Branch of the Elizabeth River.

The Supplemental Site Investigation Report (CH2M HILL, September 2005) has identified and recommended two hot spot remediation areas (Metallic Slag Area and Elevated Subsurface Polycyclic Aromatic Hydrocarbons [PAHs] Area) associated with Site 19. The removal of those two areas will be the primary focus of Task Order 059.

1.2.1 Removal of Metal Slag Area

The Metallic Slag Area is located south of the former Building 190. The extent of the removal is approximately 2,866 ft^2. The depth of removal is 1.5 feet below ground surface (bgs). The soil shall be transported and disposed of at a permitted off-site disposal facility. The removal area shall be brought back to grade and restored.

1.2.2 Removal of Elevated Subsurface PAHs Area

The Elevated Subsurface PAHs Area is located northeast of former Building 190. The extent of the removal area is approximately 1,084 ft^2 and shall be removed to 4 feet bgs. The soil shall be transported and disposed of at a Subtitle D landfill. The removal area shall be brought back to grade, minus 4", to allow for the placement of topsoil.

1.3 HAZWOPER-Regulated Tasks

Where certain work tasks include the handling, removal, containment, investigation or other physical site management of hazardous waste/material or other regulated materials, execution of such tasks and the potential employee exposure to chemical hazards associated with these tasks may be regulated under 29CFR1910.120/29CFR1926.65. For this task order, following activities will be considered Hazardous Waste Operations (HAZWOPER)-regulated tasks because of potential exposure to site contaminants:

- Erosion and sediment control installation
- Soil sampling for waste characterization and associated Munitions and Explosives of Concern (MEC) support
- Excavation and loading of soil and associated MEC support

1.4 Non-HAZWOPER-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state HAZWOPER regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-HAZWOPER-trained personnel. The following tasks are considered to be non-HAZWOPER regulated because they should not cause exposure to site contaminants:

- Utility search
- Land surveying
- Mobilization
- Backfilling
- Site Restoration
- Demobilization

1.5 Hazard Analyses

The Table 1-1 summarizes the hazards associated with the project tasks. Refer to Section 3.0 for controls for the project hazards.

TABLE 1-1
Hazard Analyses

Potential Hazards	Project Activities							
	Utility/Land Survey	Mobilization	Erosion and Sediment Control Install	Soil Characterization Sampling	Excavation & Loading	Backfilling	Site Restoration	Demobilization
Buried Utilities			X	X	X	X	X	
Chemical Hazard-Dermal/Inhalation Exposure			X	X	X			
Dust Hazard (Silica/Metals)			X	X	X			
Electrical Safety (HS-206)		X						X
Excavations (HS-307)			X	X		X		
Fire Prevention (HS-208)		X	X	X	X	X	X	X
Fire/Explosion Hazards			X	X	X			
Hand & Power Tools (HS-210)			X	X	X	X		
Haul Truck Operations					X	X		
Heavy Equipment (HS-306)		X	X		X	X	X	X
Manual Lifting (HS-112)	X	X	X	X	X	X	X	X
Mechanical Guarding Hazards		X	X	X	X	X		X
Noise (HS-108)		X	X	X	X	X	X	X
Pressure Washing/Equip Decon (HS-506)								X
Pressurized Lines/Equipment		X	X	X	X	X	X	X
Suspended Loads			X	X	X	X	X	
Vehicle Traffic	X	X	X	X	X	X	X	X
Visible Lighting	X	X	X	X	X	X	X	X

2.0 Project Organization and Personnel

2.1 Employee Medical Surveillance and Training

JV I team members selected to execute this task order at the project site are enrolled in a Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SSC" have completed a 12-hour site safety coordinator course, or equivalent, and have documented requisite field experience. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and cardiopulmonary resuscitation (CPR). At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in JV I Standard of Practice (SOP) HS-120, *Reproduction Protection*, including obtaining a physician's statement of the employee's ability to perform hazardous activities before being assigned fieldwork.

Employee Name	Office	Responsibility	SSC/FA-CPR
Dave Leadenham	AGVIQ	JV I Program Manager	SC-C
Lee Kellam	CH2M HILL\HRO	JV I Deputy Program Manager	CPR
Kim Henderson	CH2M HILL\VBO	JV I Activity manager	SC-HW, FA-CPR
Craig Miller	AGVIQ	JV I Project Manager	FA-CPR
Janna Staszak	CH2M HILL\VBO	JV I QC Manager	SC-HW, FA-CPR
Richard Rathnow	CH2M HILL\ORO	JV I Health & Safety Manager	SC-C, SC-HW, FA-CPR
Glen Jackson	AGVIQ	JV I Health & Safety Officer	SC-HW, FA-CPR/AED
Jesse Cox	AGVIQ	JV I Site Superintendent	SC-C, FA-CPR

2.2 Project Safety Responsibilities

The Project Manager has the overall responsibility for this project and will ensure that the requirements of the contract are attained in a manner consistent with this HSP and other contract-specific requirements. The Project Manager will coordinate with the HSO to ensure that the work is completed in a manner consistent with the HSP. The HSO will be the main

contact in any on-site emergency situation and will ensure off-site emergency agencies have been contacted prior to the start of work. The Health and Safety Manager (HSM) is responsible for formulating and reviewing the HSP and ensuring that the HSP is complete and accurate. The HSM also provides technical and administrative support for the Site 4 Health and Safety Program and will be available for consultation when required. Each employee is responsible for personal safety as well as the safety of others in the work area.

2.2.1 Key Safety Personnel

The following individuals share responsibility for health and safety (H&S) at the site:

Program Manager - AGVIQ	Dave Leadenham	757-318-9420 x19
		757-544-6958 (cell)
Deputy Program Manager – CH2MHILL	Lee Kellam	757-873-1442 x23
		757-291-1284 (cell)
JV I Activity manager – CH2M HILL	Kim Henderson	757-671-8311 x440
JV I Project Manager – AGVIQ	Craig Miller	757-318-9420 x25
JV I Quality Control Manager – CH2M HILL	Janna Staszak	757-671-8311 x433
JV I Site Superintendent - AGVIQ	Jesse Cox	757-449-9262 (cell)
JV I HSM – CH2M HILL	Richard Rathnow	865-483 9005 x 572
		865-607-6734 (cell)
JV I HSO	Glen Jackson	757-318-9420 x 12
		757-644-8293 (cell)

The JV I Project Manager is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HS&E management process. The Project Manager has overall management responsibility for the tasks listed below. The Project Manager may explicitly delegate specific tasks to other staff, as described in sections that follow, but retains ultimate responsibility for completion of the following in accordance with this HSP.

- Include standard terms and conditions, and contract-specific H&S roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors).
- Select safe and competent subcontractors by:
  - Obtaining, reviewing, and accepting or rejecting subcontractor pre-qualification questionnaires.
  - Ensuring that acceptable certificates of insurance, including JV I as named additional insured, are secured as a condition of subcontract award.
  - Including H&S submittals checklists in subcontract agreements, and ensuring that appropriate site-specific safety procedures, training and medical monitoring records are reviewed and accepted prior to the start of subcontractor's field operations.
- Maintain copies of subcontracts and subcontractor certificates of insurance (including JV I as named additional insured), bond, contractors license, training and medical

monitoring records, and site-specific safety procedures in the project file accessible to site personnel.

- Provide oversight of subcontractor H&S practices per the site-specific safety plan.
- Manage the site and interface with third parties in a manner consistent with our contract and subcontract agreements and the applicable standard of reasonable care.
- Ensure that the overall and job-specific H&S goals are fully and continuously implemented.

The Health and Safety Manager responsibilities include the following:

- Review and accept or reject subcontractor pre-qualification questionnaires that fall outside the performance range delegated to the Contracts Administrator (KA).
- Review and accept or reject subcontractor training records and site-specific safety procedures prior to start of subcontractor's field operations.
- Support the HSO's oversight of subcontractor (and lower-tier subcontractors) H&S practices and interfaces with on-site third parties per the HSP.

The HSO is responsible for verifying that the project is conducted in a safe manner including the following specific obligations:

- Verify this HSP remains current and amended when project activities or conditions change.
- Verify JV I site personnel and subcontractor personnel read this HSP and sign Attachment 1 "Employee Signoff Form" prior to commencing field activities.
- Verify JV I site personnel and subcontractor personnel have completed any required specialty training (e.g., excavation) and medical surveillance as identified in Section 3, and maintain the Subcontractor H&S Tracking Form (Attachment 2).
- Verify compliance with the requirements of this HSP and applicable subcontractor health and safety plan(s).
- Act as the project "Hazard Communication Coordinator" and perform the responsibilities outlined in Section 3.2.2.
- Act as the project "Emergency Coordinator" and perform the responsibilities outlined in this HSP and in the Environmental Protection Plan (Appendix F of the Work Plan).
- Verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (e.g., as tasks or hazards change).
- Verify that project H&S forms and permits, found in Attachment 3, are being used as outlined in Section 3.
- Verify that Project Activity Self-Assessment Checklists, found in Attachment 4, are being used as outlined in Section 3.
- Implement the Drug-Free Work Place Program (Attachment 5).
- Verify that project files available to site personnel include copies of executed subcontracts and subcontractor certificates of insurance (including named as additional insured), bond,

contractor's license, training and medical monitoring records, and site-specific safety procedures prior to start of subcontractor's field operations.

- Manage the site and interface with third parties in a manner consistent with contract/ subcontract agreements and the applicable standard of reasonable care.
- Coordinate with the HSM regarding JV I and subcontractor operational performance, and third-party interfaces.
- Ensure that the overall, job-specific, H&S goals are fully and continuously implemented.

The training required for the HSO is as follows:

- HSO 10-hour course
- OHSA 10-hour course for construction
- First Aid and CPR
- Relevant competent person courses (excavation)

The HSO is responsible for coordinating with the Site Superintendent and Project Manager. In general, the Project Manager will contact the client. The Health and Safety Manager should be contacted by the HSO as appropriate.

2.3 JV Subcontractors

Subcontractors that are covered by this HSP and must be provided a copy, or briefed on the contents, of this HSP prior to initiating work on this site. However, this plan does not address hazards associated with the tasks and equipment that the subcontractor has expertise in (e.g., drilling, demolition, surveying). Subcontractors are responsible for the H&S procedures specific to their work, and are required to submit these procedures to JV I for review before the start of field work. Subcontractors must comply with the established health and safety plan(s). The JV I HSO should verify that subcontractor employee training, medical clearance, and fit test records are current and must monitor and enforce compliance with the established plan(s). JV I oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

JV I should continuously endeavor to observe subcontractors' safety performance. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. JV I is not responsible for exhaustive observation for hazards and unsafe practices of subcontract personnel. In addition to this level of observation, the HSO is responsible for confirming JV I subcontractor performance against both the subcontractor's safety plan and applicable self-assessment checklists. Project Activity Self-Assessment Checklists contained in Attachment 4 are to be used by the HSO to review subcontractor performance.

H&S-related communications with JV I subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Form included in Attachment 1.
- Request subcontractor(s) to brief the project team on the hazards and precautions related to their work.

- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action. The subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.
- When an apparent imminent danger exists, immediately remove all affected JV I employees and subcontractors, notify subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the Project Manager and HSM as appropriate.
- Document all oral H&S-related communications in project field logbook, daily reports, or other records.

3.0 Project-Specific Hazards

3.1 Munitions and Explosives of Concern (Construction Support)

MEC is a safety hazard that may constitute an imminent and substantial danger to the personnel performing environmental investigation or removal action activities and to the general public in the vicinity of these operations. MEC contamination must be considered a possibility on all formerly used defense sites (FUDS) and active military installations. The surface danger zone of a range (active or inactive), the target area, impact area, ricochet area and the secondary danger zones may be contaminated with MEC (both surface and/or subsurface contamination). The varying types of ordnance operations, munition type, angle of fire and soil types preclude the accurate estimation of the depth of any subsurface MEC.

Trained MEC support personnel will be on site to observe all intrusive site activities. A MEC Construction Support and Management Plan is included as Appendix D of the Task Order 059 Work Plan, for reference. The MEC Construction Support and Management Plan details the procedures to be followed in the event that MEC-related items are found on site. In addition to the MEC Construction Support and Management Plan, MEC construction support shall be in accordance with the August 12, 2005 ESS waiver request, provided by the Department of the Navy for Site 19 at SJCA. This ESS waiver is included in Appendix C of the Task Order 059 Work Plan. In general, all non-MEC qualified personnel will follow the safe work practices listed below:

- In the event that MEC is encountered or identified in the identified work area, all work shall be immediately ceased and an Explosives Safety Submission (ESS) must be prepared and submitted to the Navy for review.
- Non-MEC qualified personnel will not touch or disturb any object that could potentially be MEC-related.
- Only the onsite MEC support team will have the ability to determine whether a found MEC-related item is considered live or inert.
  - If the item is determined to be inert, it will be stored onsite in a secured area until transferred to Defense Reultilization and Marketing Office (DRMO) or a scrap metal facility identified by DRMO that is part of the qualified recycling program.
  - If the item is determined to be potentially live, the notification procedures included as Appendix E of the work plan must be followed.
- Non-MEC personnel SHALL NOT attempt to suspected MEC-related items for any reason.
- MEC-related items SHALL NOT be taken for souvenirs, regardless of what they are thought to be. MEC items can be very deceiving by outward appearances.
- If project personnel have any questions or concerns about MEC hazards, contact the Health and Safety Manager or MEC Safety Specialist.

MEC support personnel will provide a safety briefing for all site personnel prior to the start of intrusive activities.

3.1.1 Clearing and Grubbing

(Reserved)

3.1.2 Cranes and Rigging

(Reserved)

3.1.3 Demolition

(Reserved)

3.1.4 Heavy Equipment

Heavy equipment will be used for the majority of site activities, including excavation and backfill. The following procedures will be followed:

- JV I authorizes only those employees qualified by training or previous experience to operate heavy equipment.
- An Earthmoving Equipment Operator Evaluation Form will be completed and maintained in the project files by the HSO for all persons who operate equipment (Attachment 3).
- Equipment must be checked at the beginning of each shift to ensure the equipment is in safe operating condition and free of apparent damage. The check should include: service brakes, parking brakes, emergency brakes, tires, horn, back-up alarm, steering mechanism, coupling devices, seat belts and operating controls. All defects will be corrected before the equipment is placed in service.
  - Documentation of this inspection must be maintained on-site at all times.
  - Refer to the Earthmoving Equipment Inspection Form found in Attachment 3 of this document.
- Equipment must be on a stable foundation such as solid ground or cribbing; outriggers are to be fully extended.
- Equipment must not be used to lift personnel; loads must not be lifted over the heads of personnel.
- Equipment, or parts thereof, which are suspended must be substantially blocked or cribbed to prevent shifting before personnel are permitted to work under or between them. All controls will be in a neutral position, with the motors stopped and brakes set.
- Equipment that is operating in reverse must have a reverse signal alarm distinguishable from the surrounding noise or a signal person when the operator's view is obstructed.
- When equipment is used near energized power lines, the closest part of the equipment must be at least 10 ft from power lines < 50 kV. Provide an additional 4 ft for every 10 kV over 50 kV. A person must be designated to observe clearances and give timely

warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. All overhead power lines must be considered to be energized until the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.

- Underground utility lines must be located before excavation begins; refer to Section 3.2.7 "Procedures for Locating Buried Utilities."
- Operators loading/unloading from vehicles are responsible for seeing that vehicle drivers are in the vehicle cab or in a safe area.
- The parking brake will be set whenever equipment is parked; wheels must be chocked when parked on inclines.
- When not in operation, the blade/bucket must be blocked or grounded; the master clutch must be disengaged when the operator leaves the cab. When equipment is unattended, power must be shut off, brakes set, blades/buckets landed and shift lever in neutral.

3.1.5 Haul Trucks

- Haul truck operators should be familiar with their equipment and inspect all equipment before use.
- Haul truck operators should ensure all persons are clear before operating trucks or equipment. Before moving, operators should sound horn or alarm. All equipment should be equipped with an operational backing alarm.
- Haulage trucks or equipment with restricted visibility should be equipped with devices that eliminate blind spots.
- Employees should stay off haul roads. When approaching a haul area, employees should make eye contact and communicate their intentions directly with the equipment operator.
- Trucks are to be operated within the manufacturer's recommendations (for example, retarder charts indicate the combination of loads, grades and speeds that should not be exceeded if the truck's retarder is to work properly to ensure the truck does not descend grade at speeds greater than listed).
- Haul roads should be well lit, sufficiently wide (at least 50% of the width of the equipment on both sides of road) and equipped with reflectors to indicate access points.
- Haul roads should have adequate right-of-way signs indicating haul directions.

3.1.6 Drilling Safety

(Reserved)

3.1.7 Electrical Safety

- Ensure that under ground electric and communications utilities have been identified to the extent possible. Understand and implement the requirements of section 3.2.7 of this HSP.

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.
- All temporary wiring, including extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.
- Extension cords must be:
  - Equipped with third-wire grounding.
  - Covered, elevated, or protected from damage when passing through work areas.
  - Protected from pinching if routed through doorways.
  - Not fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated Underwriters Laboratories (UL) approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV.
- Temporary lights will not be suspended by their electric cord unless designed for suspension. Lights will be protected from accidental contact or breakage.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

3.1.8 Excavation Activities

- The maximum excavation depth anticipated for this project is a 4-ft sloped excavation. JV I personnel must notify and be granted authorization from the excavation-competent person prior to entering any excavation. JV I personnel must follow all excavation requirements established by the competent person. A competent person is an individual who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and, who has authority to take prompt corrective measures to eliminate them. The competent person must be a person designated by the JV I.
- The competent person must inspect the excavation every day and after everyday hazard increasing event. Documentation of this inspection must be maintained on site at all times.

- The use of protective systems is shall not be required when 1) excavations are made entirely of stable rock OR 2) Excavations are less than five feet in depth and examination of the ground by a competent person provides no indication of a potential cave-in.
- Prior to excavating at a location, buried utilities in the area must be identified; refer to Section 3.2.7 "Procedures for Locating Buried Utilities."
- JV I personnel must not enter any excavation where protective systems are deficient at any time, for any reason. The competent person must be notified of such conditions.

3.1.9 Fire Prevention

- Be cognizant of and adhere to Navy "Mid-Atlantic Fire Prevention Procedures and Requirements". See Attachment 17 for details.
- Fire extinguishers will be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet. Extinguishers must:
  - Be maintained in a fully charged and operable condition.
  - Be visually inspected each month.
  - Undergo a maintenance check each year.
  - The area in front of extinguishers must be kept clear.
- Post "Exit" signs over exiting doors, and post "Fire Extinguisher" signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet from any building.
- Solvent waste and oily rags must be kept in a fire-resistant, covered container until removed from the site.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

3.1.10 Hand and Power Tools

- Tools will be inspected prior to use, and damaged tools will be tagged and removed from service.
- Hand tools will be used for their intended use and operated in accordance with manufacturer instructions and design limitations.
- Maintain all hand and power tools in a safe condition.
- Use personal protective equipment (PPE) (such as gloves, safety glasses, earplugs, and face shields) when exposed to a hazard from a tool.
- Do not carry or lower a power tool by its cord or hose.
- Portable power tools will be plugged into GFCI-protected outlets; and
- Portable power tools will be UL listed and have a three-wire grounded plug or be double insulated.

- Disconnect tools from energy sources when they are not in use, before servicing and cleaning them, and when changing accessories (such as blades, bits, and cutters).
- Safety guards on tools must remain installed while the tool is in use and must be promptly replaced after repair or maintenance has been performed.
- Store tools properly in a place where they will not be damaged or come in contact with hazardous materials.
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications.
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.).
- When using a knife or blade tool, stroke or cut away from the body with a smooth motion. Be careful not to use excessive force that could damage the tool, the material being cut or unprotected hands.
- Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

3.1.11 Sample Handling

Sample handling, packaging, and preservation will be conducted in support of field activities. Employee safe work practices and procedures to be followed during these activities include:

- Skin contact with contaminated water, soils, debris, or equipment shall be avoided at all times.
- Caution should be exercised when filling bottles containing acid or base preservatives. Both liquid and vapor phases of acid can cause severe burns.
- Following sample collection, sample container lids should be tightened securely to prevent any leaks, and the containers should be rinsed with clean water to ensure that they are free of chemical constituents. Sample activities, sample collection, and equipment decontamination procedures.
- Personnel handling acids and the other corrosive materials are required to wear long pants, long-sleeved shirts, and sturdy, hard toe work boots (preferably leather). In addition, nitrile gloves and chemical goggles must be worn. All transfers should take place in a properly operational fume hood (when indoors), a well-ventilated area or outdoors. In the event of a small spill, the spill area should be thoroughly flushed with water.

3.1.12 Ladders and Stairways

- (Reserved)

3.1.13 Manual Lifting

- JV I or subcontract personnel must notify supervisors or designated safety representatives of pre-existing medical conditions that may be aggravated or re-injured by lifting activities, such that the JV I may evaluate safe operational procedures with regard to the required task.

- Proper lifting techniques (use of knees and not back) must be used when lifting any object:

  – Plan storage and staging to minimize lifting or carrying distances.
  – Split heavy loads into smaller loads.
  – Use mechanical lifting aids whenever possible.
  – Have someone assist with the lift— especially for heavy (>50 lbs.) or awkward loads. Note: If JV I personnel are not capable of lifting 50 lbs. seek assistance from a team member to split the load.
  – Make sure the path of travel is clear prior to the lift.

3.1.14 Machine Guarding

- Ensure that all machine guards are in place to prevent contact with drive lines, belts, chains, pinch points or any other sources of mechanical injury.

- Unplugging jammed equipment will only be performed when equipment has been shut down, all sources of energy have been isolated, and equipment has been locked/tagged and tested.

- Maintenance and repair of equipment that results in the removal of guards or would otherwise put anyone at risk requires lockout of that equipment prior to work.

3.1.15 Noise

Unprotected exposure to excessive noise levels may lead to gradual and permanent hearing loss. The greater the intensity of a noise and the longer a person is exposed to the noise, the greater the chance of hearing loss. A hearing loss can be permanent or temporary. After certain noise exposures, a person may experience a temporary threshold shift (hearing loss) that results in the inability to hear certain sounds. The ability to hear will usually return. However, repeated or intense noise exposure can prevent this recovery, resulting in permanent hearing loss.

Each employee is responsible for the following tasks:

- Notify the HSO of high-noise-level areas.

- Hearing protection must be worn when required. Hearing protection must not be removed when in high noise level work environments, unless audiometric monitoring is conducted and is determined to be safe to do so.

  – Hearing protection is required in work environments exceeding 85 dB.

- Hearing protection will be worn when operating heavy equipment and when working in close proximity to high-noise sources.

3.1.16 Pressure-Washing Operations

(Reserved)

3.1.17 Suspended Loads

- Suspended loads will not pass over workers at any time.
- Site personnel are prohibited from passing under suspended loads.
- Tag lines will be used for all suspended loads so that riggers and tenders will not have to be in direct contact with any suspended load while controlling position or orientation.
- Rigging shall be properly stored, in a vertical position where possible, and inspected daily, by a competent person, before use. An inspection log must be maintained to document inspection proceedings and condition of the rigging. Damaged rigging must be immediately removed from service.
- Only load rated (tagged or labeled) rigging shall be utilized on JV I projects. User shall familiarize themselves with design load rate capacities for vertical, basket/cradle or choker rigging applications.

3.1.18 Slips, Trips and Falls

- Clear walkways work areas of objects.
- Maintain three -point contact when entering or exiting heavy equipment.
- Identify uneven surfaces or ground protrusions.
- Institute and maintain good housekeeping practices.
- Observe/avoid debris in a work area.
- Walk or climb only on surfaces designed for personnel access.
- Be aware of poor footing and potential slipping and tripping hazards in the work area (wet/steep slopes, holes, ditches, rip rap, utilities). Observe and avoid areas of unprotected holes, ramps and ground penetrations or protrusions (stumps, roots, holes curbs, utility structures etc). Employees walking in ditches, swales and other drainage structures adjacent to roads, across undeveloped land or in controlled industrial work/process areas must use caution to prevent slips and falls, which could result in twisted or sprained ankles, knees, and backs.
- If steep/uneven terrain must be negotiated, sturdy hard toe work boots, (preferably leather) that provide ankle support shall be used. Work boots shall have shank/toe protection in accordance with American National Standards Institute (ANSI) standards.

3.1.19 Uneven Walking Surfaces

- Whenever possible observe the conditions from a flat surface and do not enter a steep ditch or side of a steep road bed.
- If steep terrain must be negotiated, sturdy hard toe work boots that provide ankle support should be used. The need for ladders or ropes to provide stability should be evaluated prior to exercising this option.

3.1.20 Exposure to Vehicular Traffic

The following precautions must be taken when working around traffic, and in or near an area where traffic controls have been established:

- Exercise caution when exiting to a traveled way or parking along street. Avoid sudden stops, use flashers, etc.
- Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.
- All staff working adjacent to a traveled way or within a work area must wear reflective/high-visibility safety vests.
- Eye protection should be worn to protect from flying debris.
- Remain aware of factors that influence traffic-related hazards and required controls— sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.
- Always remain aware of an escape route -- behind an established barrier, parked vehicle, guardrail, etc.
- Always pay attention to moving traffic – never assume drivers are looking out for you.
- Work as far from traveled way as possible to avoid creating confusion for drivers.
- When workers must face away from traffic, a "buddy system" should be used, where one worker is looking toward traffic.
- Review traffic control devices to ensure that they are adequate to protect your work area. Traffic control devices should: 1) convey a clear meaning, 2) command respect of road users, and 3) give adequate time for proper traffic response. The adequacy of these devices is dependent on limited sight distance, proximity to ramps or intersections, restrictive width, duration of job, and traffic volume, speed, and proximity.

In addition to the above safe work practices, JV I personnel and JV I subcontractors shall adhere to the following procedures while operating motor vehicles or other motorized equipment on military/government facilities.

- **Always using a seat belt while driving on military/government facilities,**
- **Always observe posted speed limits, traffic signs and signals.**

- **Never using a cell phone or two way radio <u>while driving</u> on military/government facilities.**

Violating these rules may result in loss of military/government facility driving privileges.

3.1.21 Visible Lighting

- While work is in progress outside, construction areas will have at least 33 lux (lx) (~3 footcandles). (Note: A footcandle is a unit of illumination on a surface that is everywhere one foot from a point source of one candle.)
- Site work should be performed during daylight hours whenever possible. If not supplemental lighting must be provided. (Note: Work conducted during hours of darkness requires enough illumination intensity to read a newspaper without difficulty.)
- Do not enter poorly lit areas without first providing portable illumination.
- Do not use non-explosion proof lighting in areas of flammable or combustible gases or liquids.

3.1.22 Working Around Material Handling Equipment

- Never approach operating equipment from the rear. Always make positive contact with the operator, and confirm that the operator has stopped the motion of the equipment.
- Never approach the side of operating equipment; remain outside of the swing and turning radius.
- Maintain distance from pinch points of operating equipment.
- Because heavy equipment may not be equipped with properly functioning reverse signal alarms, never turn your back on any operating equipment.
- Never climb onto operating equipment or operate contractor/subcontractor equipment.
- Never ride contractor/subcontractor equipment unless it is designed to accommodate passengers, equipped with firmly attached passenger seat.
- Never work or walk under a suspended load.
- Never use equipment as a personnel lift; do not ride excavator buckets or crane hooks.
- Always stay alert and maintain a safe distance from operating equipment, especially equipment on cross slopes and unstable terrain.

3.1.23 Working Above or Near Water

(Reserved)

3.2 General Hazards

3.2.1 General Practices and Housekeeping

- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, and/or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies will be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers should be provided for collecting trash and other debris and will be removed at regular intervals.
- All spills will be quickly cleaned up. Oil and grease will be cleaned from walking and working surfaces.

3.2.2 Hazard Communication

The HSO, or designee, is to perform the following:

- Review of the Contaminant of Concern information contained in Table 3-1 (section 3.5). Additional applicable Hazard Communication information is included in Attachment 8 of this HSP.
- Complete an inventory of chemicals brought on site. See Attachment 8.
- Confirm that an inventory of chemicals brought on site is available.
- Request or confirm locations of Material Safety Data Sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which JV I employees are potentially exposed. Maintain MSDSs in this HSP (Attachment 6).
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific HAZCOM training using Attachment 7.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

3.2.3 Shipping and Transportation of Chemical Products

Chemicals brought to the site might be defined as hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

3.2.4 Heat Stress

- It is recommended that personnel drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°F to 60°F should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons per day. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate yourself by slowly increasing workloads (e.g., do not begin with extremely demanding activities).
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shelter/shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. Persons who experience signs of heat syncope, heat rash, or heat cramps should consult the HSO to avoid progression of heat-related illness.

SYMPTOMS AND TREATMENT OF HEAT STRESS					
	Heat Syncope	**Heat Rash**	**Heat Cramps**	**Heat Exhaustion**	**Heat Stroke**
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool–but not cold–water. Call ambulance, and get medical attention immediately!

3.2.5 Monitoring Heat Stress

These procedures should be considered when the ambient air temperature exceeds 70˚F, the relative humidity is high (>50 percent), or when workers exhibit symptoms of heat stress.

The heart rate (HR) should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 100 beats/minute, or 20 beats/minute above resting pulse. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 100 beats/minute at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 100 beats/minute, or 20 beats/minute above resting pulse.

3.2.6 Cold Stress

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-chill index is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- NSC Guidelines for Work and Warm-Up Schedules can be used with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; workers should be monitored for symptoms of cold-related illnesses. If symptoms are not observed, the work duration can be increased.

- Persons who experience initial signs of immersion foot, frostbite, hypothermia should consult the HSO to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast— be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS			
	Immersion (Trench) Foot	**Frostbite**	**Hypothermia**
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm–but not hot–water. Have victim drink warm fluids, but not coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but not coffee or alcohol. Get medical attention.

Wind Chill Chart

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

3.2.7 Procedures for Locating Buried Utilities

Local Utility Mark-Out Service

Name: Miss Utility of Virginia

Phone: 1-800-552-7001

- Follow COMNAVREG MIDLANT Instruction 11300.1 must be followed for all ground-disturbing projects. **See Attachment 16**.
- Secure the services of a second party utility locate service (specialty subcontractor) to verify local utility Mark Out Services (i.e. Miss Utility), especially in areas of congested utility groupings, in areas of government/military facilities where access by local utility mark-out services are in question/inaccessible or other special situations. An independent utility survey company shall be hired to locate and verify all subsurface utilities present in the work area utilizing such technologies such as:
  - Ground Penetrating Radar (GPR),
  - Radio Frequency (RF),
  - Dual RF,
  - Ferromagnetic Detectors
  - Electronic markers

A combination of one or more of the above technologies should be used. This survey should be conducted prior to and within 10 days of any ground disturbing activities. The Project Manager or Site Superintendent shall ensure that a JV I representative is on-site to verify/observe the activities of the second party utility locate service.

- A dig permit must be issued prior to any ground-disturbing activities.
- Obtain utility diagrams for the facility.
- Review locations of sanitary and storm sewers, electrical conduits, water supply lines, natural gas lines, and fuel tanks and lines.
- Review proposed locations of intrusive work with facility personnel knowledgeable of locations of utilities. Check locations against information from utility mark-out service.
- Underground utility locations must be physically verified by hand digging using wood or fiberglass-handled tools when any adjacent subsurface construction activity (e.g. mechanical drilling, excavation) work is expected to come within 5 feet of the marked underground system. If subsurface construction activity is within 5 feet and parallel to a marked existing utility, the utility location must be exposed and verified by hand digging every 100 feet.
- Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change n advancement of auger or split spoon).
- When the client or other onsite party is responsible for determining the presence and locations of buried utilities, the Site Superintendent should confirm that arrangement.

- When the client or other on-site party is responsible for determining the presence and locations of buried utilities, the HSO should confirm that arrangement.

3.3 Biological Hazards and Controls

Attachment 9 provides a Biological Hazard Fact Sheet. The following sections provide information on potential biological hazards.

3.3.1 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. **DO NOT** apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings.

3.3.2 Poison Ivy and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Become familiar with the identity of these plants. Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention. See attached Biological Fact Sheets.

3.3.3 Ticks

Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch in size. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray **only outside** of clothing with permethrin or permanone and spray skin with only DEET; and check yourself frequently for ticks.

If bitten by a tick, grasp it at the point of attachment and carefully remove it. After removing the tick, wash your hands and disinfect and press the bite areas. Save the removed tick. Report the bite to human resources. Look for symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme: a rash might appear that looks like a bullseye with a small welt in the center. RMSF: a rash of red spots under the skin 3 to 10 days after the tick bite. In both cases, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, seek medical attention. See attached Biological Fact Sheets

3.3.4 Bees and Other Stinging Insects

Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the HSO and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

3.3.5 Bloodborne Pathogens

Exposure to bloodborne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and PPE are required. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

3.3.6 Mosquito Bites

Because of the recent detection of the West Nile Virus in the Southeastern United States, it is recommended that **preventative measures** be taken to reduce the probability of being bitten by mosquitoes whenever possible. Mosquitoes are believed to be the primary source for exposure to the West Nile Virus as well as several other types of encephalitis. The following guidelines should be followed to reduce the risk of these concerns for working in areas where mosquitoes are prevalent.

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET because mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET (N,N-diethyl-meta-toluamide). DEET in high concentrations (greater than 35%) provides no additional protection.
- Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.

Note: Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

Symptoms of Exposure to the West Nile Virus

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

The West Nile Virus incubation period is from 3-15 days.

If you have any questions or to report any suspicious symptoms, contact the project Health and Safety Manager.

3.4 Radiological Hazards and Controls

Hazards	Controls
None Known	None Required

3.5 Constituents of Concern

Constituents of concern associated with the execution of this task order are listed in Table 3-1.

TABLE 3-1 CONSTITUENTS OF CONCERN
(Refer to Project Files and/or Attachment 8 of this HSP for more detailed Constituent of Concern and Hazard Communication information)

Constituent	Location & Max.[a] Concentration	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Aluminum	SS: 6,520 ppm	10 mg/m^3	ND	Irritation of eyes, skin, respiratory system	NA
Antimony	SS: 7.1 ppm	0.05 mg/m^3	50 mg/m^3	Irritation of skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea, stomach cramps, insomnia, anorexia, unable to smell properly	NA
Arsenic	SS: 15.6 ppm	0.01 mg/m^3	5 mg/m^3 Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation	NA
Barium (as Barium Sulfate)	SS: 264 ppm	10 mg/m^3	ND	Irritation of eyes, nose, upper respiratory system, benign pneumoconiosis (baritosis)	NA
Boron	SS: 4.6	10 mg/m^3	NA	Breathing moderate amounts of boron can cause irritation of nose, throat and eyes, effects to the reproductive system. Ingestion of large amounts can cause GI disturbances and affect the liver, kidney and brain.	NA
Calcium (as calcium carbonate)	1,610 ppm	10 mg/m^3	ND	Irritation of eyes, skin, respiratory system	NA
Cadmium	SS: 52.5 ppm	0.005 mg/m^3	9 mg/m^3 Ca	Pulmonary edema, coughing, chest tightness/pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, difficulty breathing, loss of sense of smell, emphysema, mild anemia	NA
Chromium Cr(III))	SS:195 ppm	0.5 mg/m^3	25 mg/m^3	Irritated eyes, sensitization dermatitis, histological fibrosis of lungs	NA
Cobalt (metal dust)	SS: 6.4 ppm	0.05 mg/m^3	20 mg/m^3	Cough, breathing difficulty, wheezing, decreased pulmonary function, weight loss, dermatitis, diffuse nodular fibrous, respiratory hypersensitivity, asthma	NA
Copper (dust)	SS: 1,780 ppm	1 mg/m^3	100 mg/m^3	Irritation of eyes, respiratory system, cough, breathing difficulty, wheezing	NA
Cyanide (as sodium or potassium cyanide)	SS: 8.1	5 mg/m^3 10 min. ceiling	25 mg/m^3	Irritation of eyes, skin; asphyxia, weakness, headache, confusion, nausea, vomiting, increased respiratory rate, thyroid, blood changes	NA
Iron (iron oxide dust)	SS: 55,100 ppm	0.5 mg/m^3	2500 mg/m^3	Benign pneumoconiosis with x-ray shadows indistinguishable from fibrotic pneumoconiosis	NA
Lead	SS: 885 ppm	0.05 mg/m^3	100 mg/m^3	Weakness lassitude, facial pallor, pal eye, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA

TABLE 3-1 CONSTITUENTS OF CONCERN
(Refer to Project Files and/or Attachment 8 of this HSP for more detailed Constituent of Concern and Hazard Communication information)

Constituent	Location & Max.[a] Concentration	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Magnesium (as magnesite)	SS: 1,180 ppm	10 mg/m^3	ND	Irritation of eyes, skin, respiratory system; cough	NA
Manganese (metals)	SS: 596 ppm	1 mg/m^3	500 mg/m^3	Parkinson's, asthenia, insomnia, mental confusion, dry throat, cough, chest tightness, decrease in pulmonary function, rales, flu-like fever, low-back pain, vomiting, feeling of discomfort, weakness, kidney damage	NA
Mercury	SS: 0.27 ppm	0.05 mg/m^3	10 mg/m^3	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumontitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	NA
Molybdenum	SS: 9.6 ppm	10 mg/m^3	5000 mg/m^3	In animals: irritation of eyes, nose, throat; anorexia, diarrhea, weight loss, listlessness; liver, kidney damage	NA
Naphthalene	SS: 580 ppb	10 ppm (50 mg/m^3)	250 ppm (5.24 mg/m^3)	Eye irritation, headache, confusion, excitement, nausea, vomiting, abdominal pain, bladder irritation, profuse sweating, dermatitis, corneal damage, optical neuritis	8.12
Nickel (metal)	SS: 51	0.15 mg/m^3	10 mg/m^3	Dermatitis, allergic asthma, pneumotosis	NA
PAHs (Limits as Coal Tar Pitch)	SS: 110270 ppb	0.1 mg/m^3	80 mg/m^3 Ca	Dermatitis and bronchitis, potential carcinogen.	UK
Selenium	SS: 1	0.2 mg/m^3	1 mg/m^3	Irritation of eyes, skin, nose, throat; visual disturbance, headache, chills, fever, breathing difficulty, metallic taste, garlic breath, GI disturbances, dermatitis	NA
Silver (metal)	SS: 1.3	0.01 mg/m^3	10 mg/m^3	Blue-gray eyes, nasal septum, throat; irritation, ulceration skin; GI disturbance	NA
Vanadium (dust)	SS: 17.1	0.05 mg/m^3 10 min. ceiling	35 mg/m^3	Irritation of eyes, skin, throat; green tongue, metallic taste, eczema; cough; fine rales, wheezing, bronchitis, breathing difficulty	NA

Footnotes:
* Results are in parts per billion (ppb).
[a] Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), S (Surface Soil), SL (Sludge), SW (Surface Water).
[b] Appropriate value of PEL, REL, or TLV listed.
[c] IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.
[d] PIP = photoionization potential; NA = Not applicable; UK = Unknown.

3.6 Potential Routes of Exposure

Dermal: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 4.

Inhalation: Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 4 and 5, respectively.

Other: Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking). An additional alternate route of exposure could be posed if injection occurs during a puncture wound or laceration. This type of exposure route is uncommon.

4.0 Behavior Based Loss Prevention System

A Behavior Based Loss Prevention System (BBLPS) has been implemented on this project. BBLPS is a system to prevent or reduce losses using behavior-based tools and proven management techniques to focus on behaviors or acts that could lead to losses.

The four basic loss prevention tools that will be used to implement the BBLPS on this project include:

- Activity Hazard Analysis (AHA)
- Pre-Task Safety Plans (PTSP)
- Safe Work Observations (SWO)
- Loss and Near Loss Investigations (NLI)

The Site Superintendent is responsible for implementing the BBLPS on the project site. The Site Superintendent delegates authority to the HSO for the implementation of the BBLPS on the project site, but the Site Superintendent remains accountable for its implementation. The HSO will only oversee the subcontractor's implementation of their AHAs and PTSPs processes on the project.

4.1 Activity Hazard Analysis

An AHA defines the activity being performed, the hazards posed, and control measures required to perform the work safely. Workers are briefed on the AHA before doing the work and their input is solicited before, during and after the performance of work to further identify the hazards posed and control measures required.

AHAs will be prepared before beginning each project activity posing H&S hazards to project personnel using the AHA form provided in Attachment 10. The AHA will identify the work tasks required to perform each activity, along with potential H&S hazards and recommended control measures for each work task. In addition, a listing of the equipment to be used to perform the activity, inspection requirements and training requirements for the safe operation of the equipment listed must be identified.

An AHA will be prepared for all field activities performed by JV I and subcontractors during the course of the project and should be reviewed and accepted by the Health and Safety Manager. The Project-Specific, General, and Biological Hazards (Sections 3.1, 3.2, and 3.3, respectively), the Hazard Analysis Table (Table 1-1) and respective applicable JV I partner SOPs should be used as a basis for preparing these AHAs.

JV I subcontractors will be required to provide AHAs specific to their scope of work on the project for acceptance by the HSO. Each subcontractor will submit AHAs for their field activities, as defined in their work plan/scope of work, along with their project-specific HSP. Additions or changes in JV I or subcontractor field activities, equipment, tools or material to perform work or additional/different hazard encountered that require additional/different hazard control measures requires either a new AHA to be prepared or an existing AHA to be revised.

4.2 Pre-Task Safety Plans

Daily safety meetings are held with all project personnel in attendance to review the hazards posed and required H&S procedures/AHAs that apply for each day's project activities. The PTSPs serve the same purpose as these general assembly safety meetings, but the PTSPs are held between the crew supervisor and their work crews to focus on those hazards posed to individual work crews. At the start of each day's activities, the crew supervisor completes the PTSP, provided in Attachment 11, with input from the work crew, during their daily safety meeting. The day's tasks, personnel, tools and equipment that will be used to perform these tasks are listed, along with the hazards posed and required H&S procedures, as identified in the JSA. The use of PTSPs better promotes worker participation in the hazard recognition and control process, while reinforcing the task-specific hazard and required H&S procedures with the crew each day. The use of PTSPs is a common safety practice in the construction industry.

4.3 Safe Work Observations

Safe Work Loss-Prevention Observations (SWOs) will be conducted by Site Superintendent/HSO for specific work tasks or operations comparing the actual work process against established safe work procedures identified in the project-specific HSP and AHAs. SWOs are a tool to be used by supervisors to provide positive reinforcement for work practices performed correctly, while also identifying and eliminating deviations from safe work procedures that could result in a loss. Site Superintendent/HSO will perform at least one SWO each week for tasks/operations addressed in the project-specific HSP or AHA. The Site Superintendent/HSO will complete the SWO form in Attachment 12 for the task/operation being observed, following the process below.

4.4 Loss/Near-Loss Investigations

Loss/near-loss investigations will be performed for the all JV I and subcontractor incidents involving:

- Person injuries/illnesses and near-miss injuries
- Equipment/property damage
- Spills, leaks, regulatory violations
- Motor vehicle accidents

The causes of loss and near-loss incidents are similar, so by identifying and correcting the causes of near-loss incidents, future loss incidents may be prevented. The following is the loss/near-loss investigation process:

- Gather all relevant facts, focusing on fact-finding, not fault-finding, while answering the who, what, when, where, and how questions.
- Draw conclusions, pitting facts together into a probable scenario.
- Determine incident root cause(s), which are basic causes on why an unsafe act/ condition existed.

- Develop and implement solutions, matching all identified root causes with solutions.
- Communicate incident as a lesson learned to all project personnel.
- File follow-up on implemented corrective active action to confirm solution is appropriate.

Site Supervisors/HSO will perform an incident investigation, as soon as practical after incident occurrence during the day of the incident, for all loss and near-loss incidents that occur on the project. Loss and near-loss incident investigations will be performed using the following incident investigation forms provided in Attachment 13:

- Incident Report Form (IRF)
- Incident Investigation Form
- Root Cause Analysis Form

All loss and near-loss incidents involving personal injury, property damage in excess of $1,000 or near-loss incidents that could have resulted in serious consequences will be investigated by completing the incident investigation forms and submitting them to the Activity Manager, Project Manager, and HSM within 24 hours of incident occurrence. A preliminary Incident Investigation and Root Cause Analysis will be submitted to the Activity Manager, Project Manager, and HSM within 24 hours of incident occurs. The final Incident Investigation and Root Cause Analysis will be submitted after completing a comprehensive investigation of the incident.

5.0 JV I Personal Protective Equipment

PPE specifications are listed in Table 5-1.

TABLE 5-1
Personal Protective Equipment[a]

Task	Level	Body	Head	Respirator [b]
• Mobilization • Utility Survey • Land Survey Surveying • Erosion Control • Backfilling • Site Restoration • Demobilization	D	**Coveralls:** Work clothes (i.e. Long Pants, Long Shirt), Reflective Safety Vest/High Visibility Clothing **Boots:** Sturdy, Hard-toe (ANSI rated) work boots (preferably leather) **Gloves:** Leather work gloves.	Hardhat [c] Safety glasses Ear protection [d]	None required
• Initial soil sampling for waste characterization • Soil Excavation & Loading	Modified D	**Coveralls:**,Uncoated Tyvek® Reflective Safety Vest/High Visibility Clothing **Boots:** Sturdy, Hard-toe (ANSI rated) work boots (preferably leather Outer rubber boots taped at joint**Gloves:** Inner & Outer surgical-style nitrile chemical-resistant nitrile gloves taped at joint	Hardhat [c] Safety glasses Face Shield Ear protection [d]	None required
• A task order related function where respiratory and/or dermal exposure to oil or hazardous waste/ materials will occur as a result of encountered unidentified conditions (See Upgrade Below) • Contact HSM or HSO prior to implementing Level C PPE	C	**Coveralls:** Uncoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-H cartridges or equivalent[e].

Reasons for Upgrading or Downgrading Level of Protection	
Upgrade[f]	**Downgrade**
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 6) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decrease the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Modifications are as indicated. JV I will provide PPE only to JV I employees.
[b] No facial hair that would interfere with respirator fit is permitted.
[c] Hardhat and splash-shield areas are to be determined by the HSO.
[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.
[e] Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is > 85%, or if organic vapor measurements are > midpoint of Level C range (refer to Section 5)--then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.
[f] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an HSO qualified at that level is present.

6.0 Air Monitoring/Sampling

Air Monitoring Equipment Specifications are listed in Table 6-1.

6.1 Air Monitoring Specifications

TABLE 6-1
Air Monitoring Equipment Specifications

Instrument	Tasks	Action Levels[a]	Level of Protection	Frequency [b]	Calibration
PID: OVM with 11.7eV lamp or equivalent **FID:** OVA model 128 or equivalent	Sampling Excavation Loading	<5ppm >5 ppm	Level D Level C - Contact HSM	Initially and periodically during task	Daily
Dust Monitor: Miniram model PDM-3 or equivalent	Sampling Excavation Loading	<0.5 mg/m^3 >0.5mg/m^3	Level D Level C - Or use dust suppression methods to maintain below this level	Initially and periodically during tasks	Zero Daily
Nose-Level Monitor [e]:	As needed	<85 dB(A) 85-120 dB(A) >120 dB(A)	No hearing protection required Hearing protection required Stop; re-evaluate	To determine if hearing protection may be removed.	Daily

[a] Action levels apply to sustained breathing-zone measurements above background.
[b] The exact frequency of monitoring depends on field conditions and is to be determined by the HSO; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., “Breathing Zone/MW-3”, “at surface/SB-2”, etc.).
[c] If the measured percent of O_2 is less than 10, an accurate LEL reading will not be obtained. Percent LEL and percent O_2 action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O_2 action levels are required for confined-space entry (refer to Section 2).
[d] Refer to SOP HS-10 for instructions and documentation on radiation monitoring and screening.
[e] Noise monitoring and audiometric testing also required.

6.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Air Monitoring equipment calibration specifications are listed in Table 6-2.

TABLE 6-2
Air Monitoring Equipment Calibration Specifications

Instrument	Gas	Span	Reading	Method
PID: OVM, 10.2 or 11.7 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T-tubing/ tedlar bag
FID: OVA	100 ppm methane	3.0 $\pm$ 1.5	100 ppm	1.5 lpm reg T-tubing/ tedlar bag
Dust Monitor: Miniram-PDM3	Dust-free air	Not applicable	0.00 mg/m^3 in "Measure" mode	Dust-free area OR Z-bag with HEPA filter

7.0 Decontamination

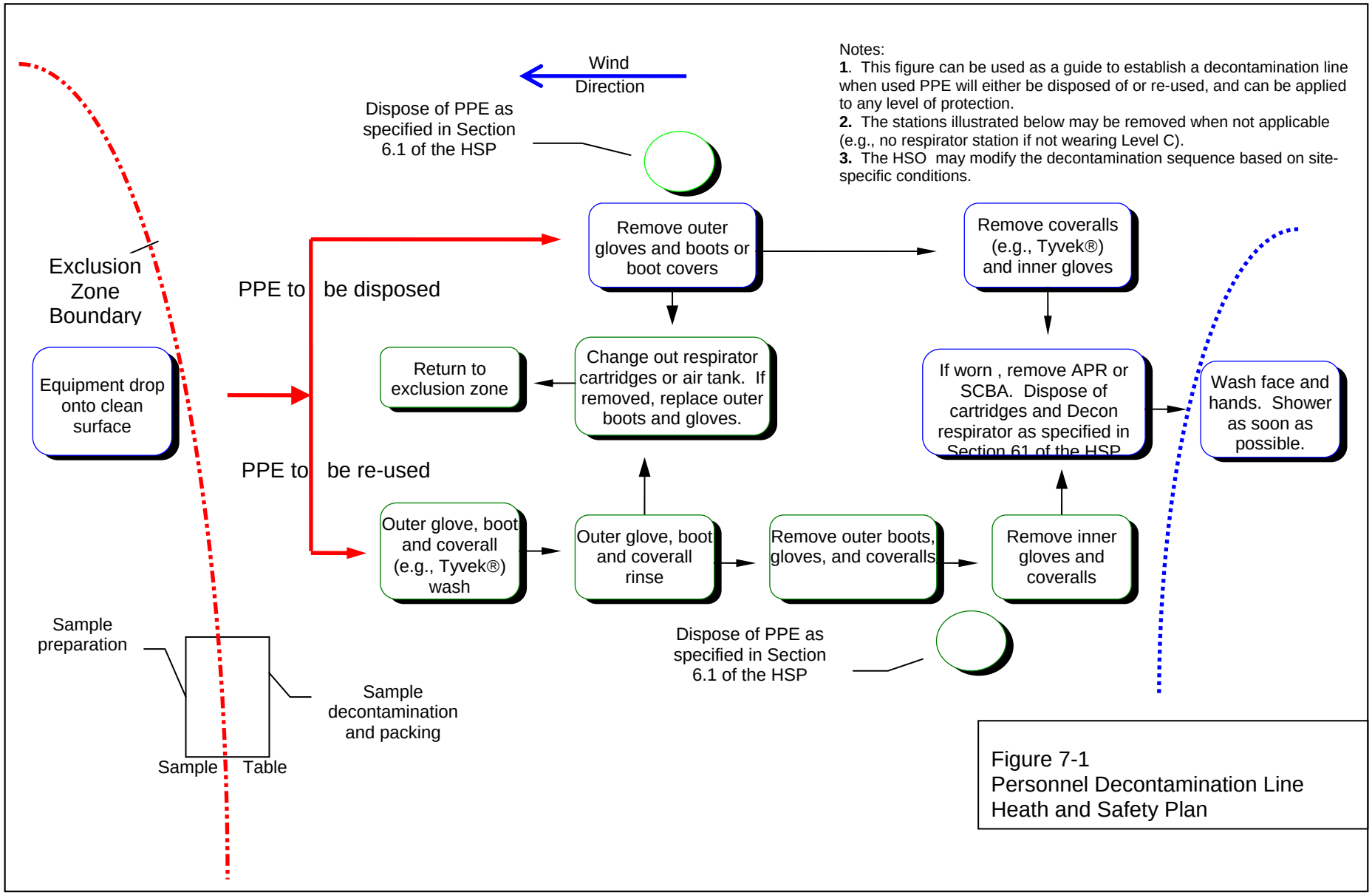
Where Level D modified or Level C PPE is utilized, the HSO, or designee, must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the HSO. The HSO must ensure that procedures are established for disposing of materials generated on the site.

7.1 Decontamination Specifications

Personnel	Sample Equipment	Heavy Equipment
• Boot wash/rinse • Glove wash/rinse • Outer-glove removal • Body-suit removal • Inner-glove removal • Respirator removal • Hand wash/rinse • Face wash/rinse • Shower ASAP • Dispose of PPE in municipal trash, or contain for disposal • Dispose of personnel rinse water to sanitary sewer if approved by the ROICC, or contain for offsite disposal	• Wash/rinse equipment • Solvent-rinse equipment • Contain solvent waste for offsite disposal	• Power wash • Steam clean • Dispose of equipment rinse water sanitary sewer when approved by the ROICC, or contain for offsite disposal

7.2 Diagram of Personnel-Decontamination Procedures

Figure 7-1 is a flow chart of the Personnel Decontamination Line. No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The HSO should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.



Notes:
1. This figure can be used as a guide to establish a decontamination line when used PPE will either be disposed of or re-used, and can be applied to any level of protection.
2. The stations illustrated below may be removed when not applicable (e.g., no respirator station if not wearing Level C).
3. The HSO may modify the decontamination sequence based on site-specific conditions.

Figure 7-1
Personnel Decontamination Line
Heath and Safety Plan

8.0 Spill-Containment Procedures

Sorbent material will be maintained in the support zone. Incidental spills will be contained with sorbent and disposed of properly.

8.1 Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human H&S, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If for some reason a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 ft in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 ft in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible the area will be roped or otherwise blocked off.

If the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation will be enforced. In general, an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled. (Consult the DOT Emergency Response Guide for isolation distances for listed hazardous materials.)

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site emergency coordinator will inform the proper agencies in the event this is necessary. An Emergency Contact List is provided in Attachment 14.

As called for in regulations developed under the comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), JV I's practice is to report a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or Toxic Substances Control Act. JV I also follows the same practice for any substances not listed in the Acts noted above but which can be classified as a hazardous waste under RCRA.

Cleanup personnel take the following measures:

- Ensure all unnecessary persons are removed from the hazard area.
- Put on protective clothing and equipment.

- If a flammable material is involved, remove all ignition sources, and use spark- and explosion-proof equipment for recovery of material.
- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.
- If wastes reach a storm sewer, dam the outfall by using sand, earth, sandbags, etc. Pump this material out into a temporary holding tank or drums as soon as possible.
- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.
- Spray the spill area with foam, if available, if volatile emissions may occur.
- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.
- For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank.

9.0 Site-Control Plan

9.1 Site-Control Procedures

(Reference SOP HS-11, *Site Control)*

- The HSO, or designee, will conduct a site safety briefing before starting field activities or as tasks and site conditions change. Topics for briefing on site safety: general discussion of Health and Safety Plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- The HSO records attendance at safety briefings and documents the topics discussed.
- Ensure that applicable JV I personnel have received the BBLPS Training.
- Understand if there is a potential of being exposed to hazardous chemicals. If yes, what precautions/training are required?
- Identify what areas, of the facility that may not be entered ("restricted areas").
- Know how an emergency should be reported.

  Identify exact facility location and position (where possible) when contacting EMS/Fire Dispatch.
- **Have readily available copy of the Hospital Route Map.**
- Determine the standard facility emergency alarms/signals.
- Designate an emergency evacuation route.
- Designate an evacuation assembly area.
- Know how, what, when injuries/accidents are reported and treated.
- Project managers and team leaders must 1) evaluate and ensure worker safety in remote/secluded work areas, 2) confirm if potentially dangerous activities (i.e. coincidence of hunting seasons, live ordnance use, military field exercises/activities, transfer of dangerous cargo/materials etc.) could be occurring in or adjacent to any JV I work areas that may jeopardize worker H&S and 3) reschedule field activities when potentially dangerous activities are not occurring adjacent to JV I work locations. Ensure proper communications with workers in remote work areas. Utilize buddy system.
- Establish support, decontamination, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals

  - Air horn
  - Two-way radio or cellular telephone if available

- Establish offsite communication.
- Establish and maintain the "buddy system."
- Initial air monitoring is conducted by the HSO in appropriate level of protection.
- The HSO is to conduct periodic inspections of work practices to determine the effectiveness of this plan – refer to Sections 2 and 3. Deficiencies are to be noted, reported to the HSM, and corrected.

9.2 HAZWOPER Compliance Plan

(Reference SOP HS-19, *Site-Specific Written Safety Plans)*

Certain parts of the site work are covered by state or federal HAZWOPER standards and therefore require training and medical monitoring. Anticipated HAZWOPER tasks (Section 1.3) might occur consecutively or concurrently with respect to non-HAZWOPER tasks. This section outlines procedures to be followed when approved activities specified in Section 1.4 do not require 24- or 40-hour training. Non-HAZWOPER-trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non-HAZWOPER-trained personnel are allowed on the site, or while non-HAZWOPER-trained staff are working in proximity to HAZWOPER activities. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data. Refer to Subsections 3.5 and 6 for contaminant data and air sampling requirements, respectively.
- When non-HAZWOPER-trained personnel are at risk of exposure, the HSO must post the exclusion zone and inform non-HAZWOPER-trained personnel of the:
  - Nature of the existing contamination and its locations
  - Limitations of their access
  - Emergency action plan for the site
- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-HAZWOPER-trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-HAZWOPER-trained personnel must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to H&S hazards.

10.0 Emergency Response Plan

(Reference SOP HS-12, *Emergency Response*)

10.1 Pre-Emergency Planning

The HSO performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with JV I on-site parties, the facility, and local emergency-service providers as appropriate.

- Review the facility emergency and contingency plans where applicable.
- Determine what on-site communication equipment is available (e.g., two-way radio, air horn).
- Determine what off-site communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to on-site personnel.
- Review changed site conditions, on-site operations, and personnel availability in relation to emergency response procedures.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital.
- Brief new workers on the emergency response plan.

The HSO will evaluate emergency response actions and initiate appropriate follow-up actions.

10.2 Emergency Equipment and Supplies

The HSO should mark the locations of emergency equipment on the site map and post the map. Equipment and locations are listed below.

Emergency Equipment and Supplies	Location
20 LB (or two 10-lb) fire extinguisher (A, B, and C classes)	Support Zone/Heavy Equipment
First aid kit	Support Zone/Field Vehicle
Eye Wash	Support & Decon Zone/Field Vehicle
Potable water	Support & Decon Zone/Field Vehicle
Bloodborne-pathogen kit	Support Zone/Field Vehicle
Additional equipment (specify): 2.5 lb fire extinguisher (A, B, and C classes)	Support Zone/Site Vehicles

10.3 Incident Reporting, Investigation and Response

The HSO is responsible for implementing the Accident Prevention Plan (Attachment 15). For any accident meeting the definition of **Recordable Occupational Injuries or Illnesses or Significant Accidents**, the NAVFAC Mid-Atlantic Contracting Officer and Navy Technical Representative (NTR) will be notified by the HSM or Project Manager soon as practical, **but not later than four hours after occurrence.** All other incidents must be reported to NAVFAC Mid-Atlantic within 24 hours of incident occurrence, via the established project chain of command structure.

Therefore, in order for the incident to be assessed for reportability purposes, it is imperative that according to JV I requirements, **all personal injuries, near misses, or property damage incidents involving JV I or subcontractor project personnel be reported IMMEDIATELY** to the JV I Project Manager, Craig Miller, and the HSM Richard Rathnow/ORO, JV Program Manager Dave Leadenham/AGVIQ, or JV I Corporate HSM Angelo Liberatore/ATL at the numbers identified in the emergency contact attachment contained in this plan. Notification to other applicable JV I team members shall be completed via a "flow down" of information via the established project chain of command structure.

The Site Superintendent or designee must **report the following incident information to the HSM immediately** after incident occurrence:

Date and time of mishap
Project name and project number
Name and worker classification
Extent of known injuries
Level of medical attention
Injury cause

A written incident investigation will be performed and submitted to the HSM within 24 hours of incident occurrence by the completing the Incident Report, Near-Loss Investigation and Root Cause Analysis provided in the HSP Attachments.

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down JV I operations and evacuate the immediate work area.
- Notify appropriate response personnel.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled, if the JV I personnel responding to the situation are properly trained/equipped, have the appropriate PPE, monitoring equipment to manage the situation.

10.4 Emergency Medical Treatment

The procedures listed below may also be applied to non-emergency incidents. JV I employee injuries and illnesses must be reported to the Human Resources contact in Attachment 14. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the JV I medical consultant, depending on whose employee is injured. During non-emergencies, follow these procedures as appropriate.

- Notify appropriate emergency response authorities listed in Section 9.8 (e.g., 911).
- The HSO will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 10.3.

A map showing the route to the hospital is shown on Figure 10-1.

10.5 Evacuation

- Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the HSO before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The HSO and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The HSO will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The HSO will write up the incident as soon as possible after it occurs and submit a report to the Corporate Director of Health and Safety.

10.6 Evacuation Signals

Evacuation signals are listed below.

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

10.7 Incident Notification and Reporting

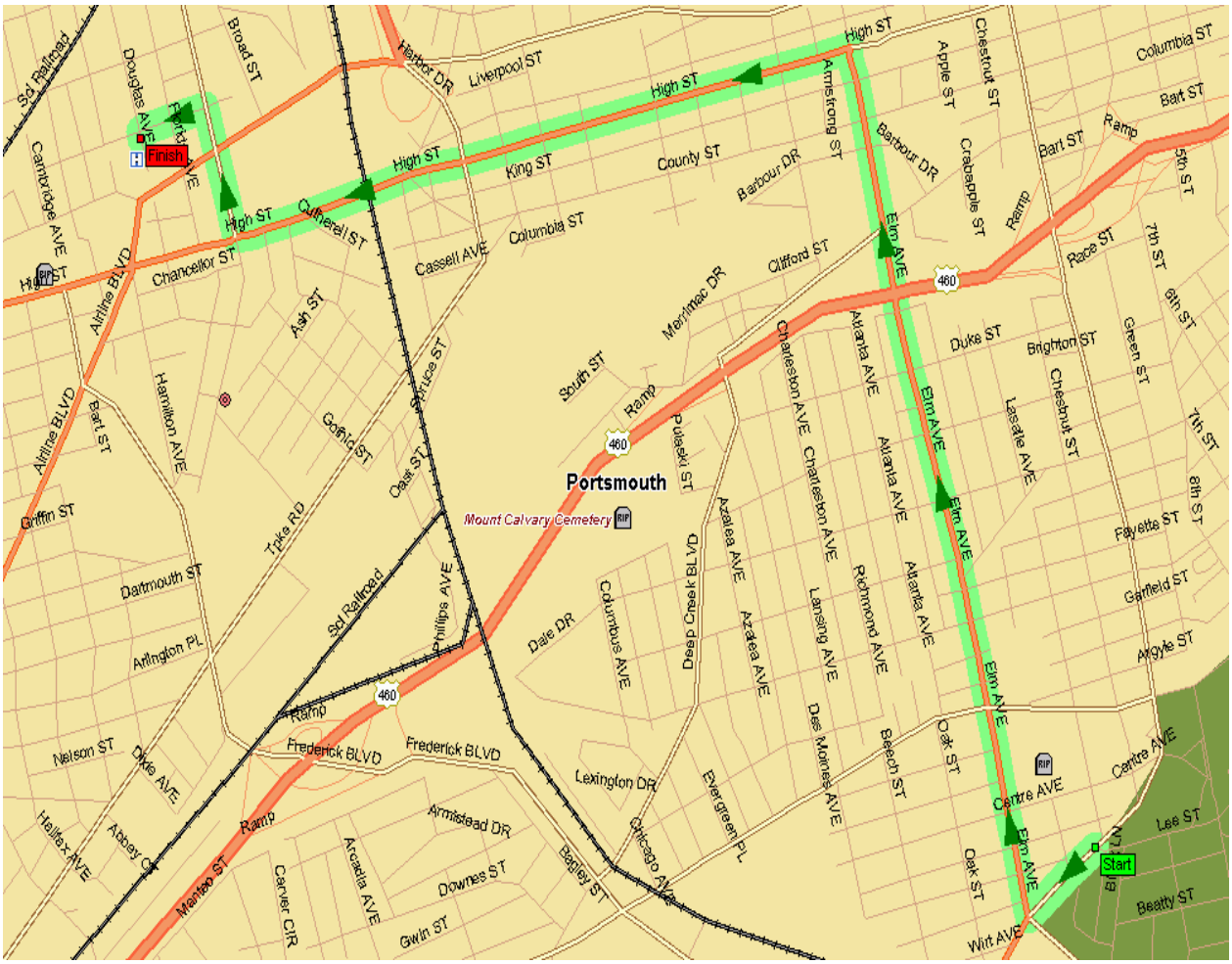
- Upon any project incident (fire, spill, injury, near miss, death, etc.), immediately notify the Project Manager and HSM. Call emergency beeper number if HSM is unavailable.
- For JV I work-related injuries or illnesses, contact the respective Human Resources contact listed in Attachment 14. For JV I incidents the human resources administrator completes an IRF. The IRF must be completed within 24 hours of incident.
- For JV I subcontractor incidents, complete the Subcontractor Accident/Illness Report Form and submit to the HSM.
- Notify and submit reports to client as required in contract.

FIGURE 10-1
SJCA - Hospital Route Map

Directions to Hospital

Leave main gate of Annex and take left onto Victory Blvd.
At route 17 (George Washington Hwy) take a right and go north.
Make left onto Fredrick Blvd, and continue on Fredrick until it dead ends.
Make left onto High Street, the Maryview Medical Center in on the right at the first light.

(Total distance about 4.5 miles).



SJCA Local Hospital – Maryview Medical Center#: 757-398-2200

SJCA EMS, Fire, Security Dispatch#: 757-396-3333*
* Identify exact facility location and position (where possible) to dispatch personnel.

Off Base Emergency -- 911

11.0 Approval

This site-specific Health and Safety Plan has been written for use by JV I only. JV I claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

11.1 Original Plan

Written By: Glen Jackson **Date: 1-12-06**

Approved By: Rich Rathnow **Date: 2-7-2006**

11.2 Revisions

Revisions Made By: **Date:**

Revisions to Plan:

Revisions Approved By: **Date:**

Attachment 1

Employee Signoff Form

EMPLOYEE SIGNOFF FORM

Health and Safety Plan

JV I project employees and subcontractors listed below have been provided with a copy of this Health and Safety Plan, have read and understood it, and agree to abide by its provisions.

Project Name: **Task Order:**

EMPLOYEE NAME (Please print)	**EMPLOYEE SIGNATURE**	**COMPANY**	**DATE**

Attachment 2

Subcontractor H&S Tracking Form

Subcontractor H&S Tracking Form

Project Name: **Task Number:** **Date:**

Subcontractor		Completed as Needed						Completed Within the Last 12 Months		
Name	Company	40-hour Training	8-hour Site Supervisor Training	Confined Space Entry Training	FA/CPR /BBP	Hazard Specific Training	Equipment Specific Training	Med Clearance	Fit Test	8-hour Refresher Training
		Enter "√" if Completed						Enter Date Last Completed		

22. Hazard Specific Training may include: Hazcom, asbestos, lead, fall protection, electrical, lock-out tag-out, drilling, demolition, etc.
23. Equipment Specific Training may include: Industrial (fork) truck, aerial lift, crane, portable extinguisher, respirator, scaffolding, etc.
24. Medical Clearance documents must **not** include actual medical reports. Only accept a signed physician's statement of fitness to work.

Attachment 3

Project H&S Forms/Permits

EXCAVATION ENTRY PERMIT

This permit will only be used by JV I staff when self-performing excavation activities and will be completed by a JV I excavation competent person. A new permit will be completed each day authorizing excavation entry. Personnel entering excavations will verify that a current permit is completed, authorized, and posted at the excavation location prior to entry. Personnel will exit the excavation and notify the excavation competent person of any unsafe condition or violation of this permit.

Excavations are required to be inspected by an excavation competent person each day, as needed throughout the work shift, and after every rain or other event that could increase the potential for excavation cave-in. This permit will document that such an inspection has been conducted and that all precautions have been taken to ensure safe entry.

GENERAL INFORMATION

Project/Site Name: _____Task Order Number:_____

Name/Location of Excavation:

_____

Scope of Work Description:

_____

EXCAVATION ENTRY PRECAUTIONS

- ☐ No tension cracks/fractures or evidence of caving, sloughing, or weak zones observed in soil
- ☐ Precautions taken to prevent surface water from entering excavation
- ☐ Water is not accumulating in excavation
- ☐ When water removal equipment used, it is monitored for proper operation
- ☐ Air monitoring conducted for excavations with hazardous atmospheres potential
- ☐ If hazardous atmosphere, ventilation used to bring conditions to safe level and tested frequently
- ☐ If ventilation unable to bring conditions to safe level, appropriate respiratory protection used
- ☐ Rescue equipment provided where potential for hazardous atmospheres exists
- ☐ Protective systems provided to prevent excavation cave-in
- ☐ Protective systems used: ☐ Benching ☐ Sloping ☐ Shoring ☐ Trench Box ☐ Combination
  Describe: _____
- ☐ Protective systems inspected and are free from damage and in stable condition
- ☐ Sloping cut to appropriate angle of incline for soil classification
- ☐ Shoring installed according to design and secured from movement
- ☐ Hydraulic shores maintained at designed pressure
- ☐ Trench boxes not subjected to loads exceeding design limits
- ☐ Vehicular traffic diverted an adequate distance from excavation
- ☐ Spoil piles, equipment, and materials restrained or kept at least 2’ (61 cm) from excavation edge
- ☐ Protection provided from material falling/rolling into excavation
- ☐ Safe means of egress provided every 25’ (7.6 m) inside excavation
- ☐ Personnel entering excavation briefed and understand planned work and safety precautions
- ☐ Additional precautions taken when entering to repair damaged or unstable protective systems

ENTRY APPROVAL

JV I Competent Person Name: _____

JV I Excavation Competent Person Signature: _____

Date/Time Entry Authorized: ____/____/_____ ____:____

EARTHMOVING EQUIPMENT INSPECTION FORM

This form will be used to document JV I's earthmoving equipment inspections. Earthmoving equipment will be inspected each day and shift prior to use. All components will be inspected for damage and proper operation. Any component failing the inspection will be corrected prior to earthmoving equipment use. Check each box after passing inspection and initial bottom of form each day.

Equipment Name: _____ Identification #: _____ Week of: _____

INSPECTION ITEM	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sa**	**Sun**
Visual Checks							
Operating manual – present							
Controls - labeled as to their function, visible and legible, safety latches/guards present							
Tires/tracks – proper inflation/tension, not excessively worn or damaged							
Fluid levels/leaks - engine, transmission, hydraulic, radiator, swing motor and PTO oils.							
Lubrication - to the manufacturer's specifications							
Air filter gauge - gauge is not in the red zone.							
Hydraulics – no fluid leaks, connections tight, hoses, cylinders free of damage.							
Hoses/belts – held securely, not loose or rubbing, no excessive wear or crimping							
Fuel system - tank free of damage, all valves/hoses secure, no leaks							
Body & ground-engaging tools – no damage, cracks, bends, or excessive wear.							
Cylinders/articulation joints– no worn pins, loose connections or other damage.							
Roll-over protective structures (ROPS) - no damage, no cracks or bends							
Seat belt/bar – required unless operator stands or no ROPS							
Handrails, steps, platforms – clean, free from grease, oil, clear of obstructions.							
Cab glass – safety glass, clean, no cracks or visible distortion							
Mirrors – properly adjusted, no cracks or visible distortion							
Windshield wipers, fluid, and defroster - functioning							
Machine guards – present and in good condition							
Fire extinguisher – present and charged							
Operational Checks – check items through normal maneuvers							
Horn & back-up alarm – operating and distinguishable from surrounding noise							
Lights, directional signals, and brake lights - functioning							
Gauges/indicators – visible and working properly							
Operating controls - lift and tilt functioning properly							
Outriggers, if present – functioning properly							
Accelerator - even acceleration, does not stick							
Brakes (service & parking) - brings to complete stop, holds in fixed position							
Steering – responsive, minimal looseness							
Exhaust system – guarded if potential for contact, no signs of sparks/leaks							
Inspector's Initials							

EARTHMOVING EQUIPMENT OPERATOR EVALUATION FORM

JV I employees who are required to operate earthmoving equipment will be evaluated and approved as qualified earthmoving equipment operators by an authorized JV I Earthmoving Equipment Operator Evaluation Designated Persons (DP).

This form will be used by the DP to assess, approve, and document the qualifications of JV I employees who are required to operate earthmoving equipment.

Employee (Operator) Name: _____ JV I employee #: _____

JV I Company: _____ Business Group: _____ Region: _____

Type of equipment to be operated:_____

1. Background Review

Resume and other documentation (training certificates) will be reviewed and verified with previous employers. The individual will also possess a valid driver's license. This review should take place prior to hiring.

☐ Background Review found to be adequate. Date: ___/___/____ DP initials: _____

2. Classroom Evaluation

a. Employee will read and understand the manufacturer's Equipment Operation Manual for the specific piece of equipment to be operated.
b. Employee will read and understand the CH2M HILL *Earthmoving Equipment* (HSE-306) and *Excavations* (HSE-307) Standards of Practice.
c. DP will discuss safe operating practices with the employee.
d. Employee will pass JV I's written earthmoving equipment operator exam. (See Attachment 4 for exam guidelines)

☐ Classroom Evaluation successfully completed. Date: ___/___/____ DP initials: _____

3. Field Evaluation

a. Equipment Awareness, Inspection and Maintenance

The DP will observe the employee perform a daily inspection using the Earthmoving Equipment Inspection Form. The employee will demonstrate the ability to recognize deficient conditions that could affect the safe operation of the equipment. In addition, the operator will demonstrate awareness of the following:

☐ Location of vital fluid reservoirs
☐ Location of all lubrication points
☐ Proper fueling procedures
☐ Location and function of safety disabling devices (if equipped)
☐ Location and function of safety devices (fire extinguisher, back-up alarm, seat belt/bar, guards)
☐ Location of manufacturer warning labels, weight of equipment, and lift capacities labels
☐ Location and function of all gauges, indicators and controls (horn, lights, mirrors, etc.)
☐ Acceptable conditions for passing items during daily inspections
☐ Periodic maintenance requirements

b. Equipment Operation

The DP will observe the employee operating the equipment through normal maneuvers. The employee will demonstrate the ability to operate the equipment safely and in accordance with the manufacturer's guidelines.

☐ Demonstrates ability to safely start equipment in preparation for use (proper start-up sequence followed)
☐ Understands function and proper appearance of all gauges and indicators
☐ Understands location and use of all equipment controls
☐ Checks front, side, and rear of equipment for pedestrians, traffic and obstructions
☐ Demonstrates smooth and safe equipment travel
☐ Demonstrates smooth and safe control operations
☐ Demonstrates safe loading and binding of equipment for travel
☐ Demonstrates normal shut-down procedures
☐ Demonstrates emergency shut-down procedures
☐ Demonstrates safe parking and storage of equipment

☐ Field Evaluation successfully completed. Date: ___/___/____ DP initials: _____

Operator Acknowledgement

I have reviewed and understand all of the information listed above. I also understand that as an operator of this equipment, I am responsible for daily inspections and maintenance as well as the safe and efficient operation of the equipment listed above.

_____ _____ _____

Operator Name Signature Date

Qualification approval

The employee has completed the earthmoving equipment operator evaluation process and is qualified to operate the type of earthmoving equipment identified above.

_____ _____ _____

DP Name Signature Date

_____ _____ _____

HS&E Name Signature Date

A copy of this evaluation form will be maintained in the project file and the original sent to the HS&E department for retention.

Attachment 4

Project Activity Self-Assessment Checklists

H&S Self-Assessment Checklist – HAND AND POWER TOOLS

This checklist shall be used by AGVIQ-CH2MHILL JOINT VENTURE 1 (JV I) personnel **only** and shall be completed at the frequency specified in the project's HSP.

This checklist is to be used at locations where: 1) JV I employees are exposed to hand and power tool hazards and/or 2) JV I provides oversight of subcontractor personnel who are exposed to hand and power tool hazards.

The HSO or designate may consult with subcontractors when completing this checklist, but shall not direct the means and methods of hand and power tool use nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Completed checklists shall be sent to the HS&E Staff for review.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate JV I employee exposure to hand and power tool hazards.
☐ Evaluate a JV I subcontractor's compliance with hand and power tool requirements.
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-50.

SECTION 1

	Yes	No	N/A	N/O
SAFE WORK PRACTICES (3.1)				
1. All tools operated according to manufacturer's instructions and design limitations.	☐	☐	☐	☐
2. All hand and power tools maintained in a safe condition and inspected and tested before use.	☐	☐	☐	☐
3. Defective tools are tagged and removed from service until repaired.	☐	☐	☐	☐
4. PPE is selected and used according to tool-specific hazards anticipated.	☐	☐	☐	☐
5. Power tools are not carried or lowered by their cord or hose.	☐	☐	☐	☐
6. Tools are disconnected from energy sources when not in use, servicing, cleaning, etc.	☐	☐	☐	☐
7. Safety guards remain installed or are promptly replaced after repair.	☐	☐	☐	☐
8. Tools are stored properly.	☐	☐	☐	☐
9. Cordless tools and recharging units both conform to electrical standards and specifications.	☐	☐	☐	☐
10. Tools used in explosive environments are rated for such use.	☐	☐	☐	☐
11. Knife or blade hand tools are used with the proper precautions.	☐	☐	☐	☐
12. Consider controls to avoid muscular skeletal, repetitive motion, and cumulative trauma stressors.	☐	☐	☐	☐

H&S Self-Assessment Checklist – HAND AND POWER TOOLS

SECTION 2	Yes	No	N/A	N/O
GENERAL (3.2.1)				
13. PPE is selected and used according to tool-specific hazards anticipated.	☐	☐	☐	☐
14. Tools are tested daily to assure safety devices are operating properly.	☐	☐	☐	☐
15. Damaged tools are removed from service until repaired.	☐	☐	☐	☐
16. Power operated tools designed to accommodate guards have guards installed.	☐	☐	☐	☐
17. Rotating or moving parts on tools are properly guarded.	☐	☐	☐	☐
18. Machines designed for fixed locations are secured or anchored.	☐	☐	☐	☐
19. Floor and bench-mounted grinders are provided with properly positioned work rests.	☐	☐	☐	☐
20. Guards are provided at point of operation, nip points, rotating parts, etc.	☐	☐	☐	☐
21. Fluid used in hydraulic-powered tools is approved fire-resistant fluid.	☐	☐	☐	☐
ELECTRIC-POWERED TOOLS (3.2.2)				
22. Electric tools are approved double insulated or grounded and used according to SOP HS-23.	☐	☐	☐	☐
23. Electric cords are not used for hoisting or lowering tools.	☐	☐	☐	☐
24. Electric tools are used in damp/ wet locations are approved for such locations or GFCI installed.	☐	☐	☐	☐
25. Hand-held tools are equipped with appropriate on/off controls appropriate for the tool.	☐	☐	☐	☐
26. Portable, power-driven circular saws are equipped with proper guards.	☐	☐	☐	☐
ABRASIVE WHEEL TOOLS (3.2.3)				
27. All employees using abrasive wheel tools are wearing eye protection.	☐	☐	☐	☐
28. All grinding machines are supplied with sufficient power to maintain spindle speed.	☐	☐	☐	☐
29. Abrasive wheels are closely inspected and ring-tested before use.	☐	☐	☐	☐
30. Grinding wheels are properly installed.	☐	☐	☐	☐
31. Cup-type wheels for external grinding are protected by the proper guard or flanges.	☐	☐	☐	☐
32. Portable abrasive wheels used for internal grinding are protected by safety flanges.	☐	☐	☐	☐
33. Safety flanges are used only with wheels designed to fit the flanges.	☐	☐	☐	☐
34. Safety guards on abrasive wheel tools are mounted properly and of sufficient strength.	☐	☐	☐	☐
PNEUMATIC-POWERED TOOLS (3.2.4)				
35. Tools are secured to hoses or whip by positive means to prevent disconnection.	☐	☐	☐	☐
36. Safety clips or retainers are installed to prevent attachments being expelled.	☐	☐	☐	☐ 37.
Safety devices are installed on automatic fastener feed tools as required.	☐	☐	☐	☐
38. Compressed air is not used for cleaning unless reduced to < 30 psi, with PPE, and guarded.	☐	☐	☐	☐
39. Manufacturer's safe operating pressure for hoses, pipes, valves, etc. are not exceeded.	☐	☐	☐	☐
40. Hoses are not used for hoisting or lowering tools.	☐	☐	☐	☐
41. All hoses >1/2-inch diameter have safety device at source to reduce pressure upon hose failure.	☐	☐	☐	☐
42. Airless spray guns have required safety devices installed.	☐	☐	☐	☐
43. Blast cleaning nozzles are equipped with operating valves, which are held open manually.	☐	☐	☐	☐
44. Supports are provided for mounting nozzles when not in use.	☐	☐	☐	☐
45. Air receiver drains, handholes, and manholes are easily accessible.	☐	☐	☐	☐
46. Air receivers are equipped with drainpipes and valves for removal of accumulated oil and water.	☐	☐	☐	☐
47. Air receivers are completely drained at required intervals.	☐	☐	☐	☐
48. Air receivers are equipped with indicating pressure gauges.	☐	☐	☐	☐
49. Safety, indicating, and controlling devices are installed as required.	☐	☐	☐	☐
50. Safety valves are tested frequently and at regular intervals to assure good operating condition.	☐	☐	☐	☐

SECTION 2 (continued)

	Yes	No	N/A	N/O
LIQUID FUEL-POWERED TOOLS (3.2.5)				
51. Liquid fuel-powered tools are stopped when refueling, servicing, or maintaining.	☐	☐	☐	☐
52. Liquid fuels are stored, handled, and transported in accordance with SOP HS-21	☐	☐	☐	☐
53. Liquid fuel-powered tools are used in confined spaces in accordance with SOP HS-17.	☐	☐	☐	☐
54. Safe operating pressures of hoses, valves, pipes, filters, and other fittings are not exceeded.	☐	☐	☐	☐
POWDER-ACTUATED TOOLS (3.2.6)				
55. Only trained employee operates powder-actuated tools.	☐	☐	☐	☐
56. Powder-actuated tools are not loaded until just prior to intended firing time.	☐	☐	☐	☐
57. Tools are not pointed at any employee at any time.	☐	☐	☐	☐
58. Hands are kept clear of open barrel end.	☐	☐	☐	☐
59. Loaded tools are not left unattended.	☐	☐	☐	☐
60. Fasteners are not driven into very hard or brittle materials.	☐	☐	☐	☐
61. Fasteners are not driven into easily penetrated materials unless suitable backing is provided.	☐	☐	☐	☐
62. Fasteners are not driven into spalled areas.	☐	☐	☐	☐
63. Powder-actuated tools are not used in an explosive or flammable atmosphere.	☐	☐	☐	☐
64. All tools are used with correct shields, guards, or attachments recommended by manufacturer.	☐	☐	☐	☐
JACKING TOOLS (3.2.7)				
65. Rated capacities are legibly marked on jacks and not exceeded.	☐	☐	☐	☐
66. Jacks have a positive stop to prevent over-travel.	☐	☐	☐	☐
67. The base of jacks are blocked or cribbed to provide a firm foundation, when required.	☐	☐	☐	☐
68. Wood blocks are place between the cap and load to prevent slippage, when required.	☐	☐	☐	☐
69. After load is raised, it is cribbed, blocked, or otherwise secured immediately.	☐	☐	☐	☐
70. Antifreeze is used when hydraulic jacks are exposed to freezing temperatures.	☐	☐	☐	☐
71. All jacks are properly lubricated.	☐	☐	☐	☐
72. Jacks are inspected as required.	☐	☐	☐	☐
73. Repair or replacement parts are examined for possible defects.	☐	☐	☐	☐
74. Jacks not working properly are removed from service and repaired or replaced.	☐	☐	☐	☐
HAND TOOLS (3.2.8)				
75. Wrenches are not used when jaws are sprung to the point of slippage.	☐	☐	☐	☐
76. Impact tools are kept free of mushroomed heads.	☐	☐	☐	☐
77. Wooden handles of tools are kept free of splinters or cracks and are tightly fitted in tool.	☐	☐	☐	☐

H&S Self-Assessment Checklist – HAND AND POWER TOOLS

<u>SECTION 3</u>

Complete this section for all items checked “No” in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: ____________________________________ Site Manager: ____

Date: ____________________________________ Date: ____

EXCAVATION PLANNING CHECKLIST

This checklist shall only be used by AGVIQ-JV1 JOINT VENTURE I (JV I) when self-performing excavation activities and shall be completed by JV I excavation competent person during excavation activities. Personnel shall be permitted to enter excavations only after the JV I Excavation Entry Permit has been completed, authorized by the excavation competent person, and posted at the excavation entrance.

GENERAL INFORMATION

Project/Site Name: _____ Project Number: _____
Name/Location of Excavation: _____ _
Scope of Work Description: _____
Excavation Depth: _____ Excavation Width: _____

PRIOR TO EXCAVATING

☐ Personnel meet training and medical surveillance requirements
☐ Dig permit obtained, where required by client/facility
☐ Client, installation owners, and utility companies contacted for exact location of underground utilities/installations
☐ Detection equipment used when exact location of underground utilities is unknown
☐ Soils to be excavated have been classified: ☐ Stable Rock ☐ Type A ☐ Type B ☐ Type C
☐ Combination, describe: _____
NOTE: If soils unclassified, assume to be Type C
☐ Groundwater table and stormwater run-off evaluated
☐ Area evaluated for existence of ordnance explosives (OE) and munitions and explosives of concern (MEC)

The Environmental Compliance Coordinator (ECC) should be consulted for the following requirements:

☐ Soils characterized where contamination may be present
☐ USDA (or local equivalent) soil permit obtained for soil transport
☐ Excavation evaluated for wetlands, endangered species, cultural/historic resources
☐ ACOE/CWA 404 (or local equivalent) permit obtained for wetland areas
☐ Stockpile management plan prepared to address national, state, and local regulations
☐ Waste discharge/NPDES (or local equivalent) permit obtained for excavation dewatering
☐ Storm Water Pollution Prevention or Erosion & Sediment Control Plan prepared, where required

GENERAL REQUIREMENTS

☐ Daily safety briefing/meeting conducted with excavation personnel
☐ Guardrails provided on walkways over excavation 6′ (1.5 m in Australia) or deeper
☐ Barriers provided at excavations 6′ (1.5 m in Australia) or deeper when not readily visible
☐ Barriers/covers provided for wells, pits, shafts, or similar excavation 6′ (1.5 m in Australia) or deeper
☐ Earthmoving equipment operated safely (use earthmoving equipment checklist in HS-27)
☐ Personnel provided with and wearing appropriate PPE

EXCAVATING ACTIVITIES

- ☐ Rocks, trees, and other unstable surface objects removed or supported
- ☐ Exposed underground utility lines supported
- ☐ Undermined surface structures supported or determined to be in safe condition
- ☐ Warning system used to remind equipment operators of excavation edge
- ☐ Stockpile covers/liners and excavation silt fences/covers provided, where required (consult ECC)
- ☐ Fugitive dust suppressed

PROTECTIVE SYSTEMS USE

- ☐ Protective systems used for excavations 5′ (1.5 m) or deeper, unless stable rock
- ☐ Protective systems for excavation deeper than 20′ (6.1 m) designed by registered PE
- ☐ Protective systems used: ☐ Sloping ☐ Shoring ☐ Trench Box ☐ Combination
  Describe: _____
- ☐ Sloping cut to appropriate angle of incline for soil classification (if unclassified, assume Type C soil)
- ☐ Shoring/trench boxes used according to manufacturer recommendations and not subjected to loads exceeding design limits
- ☐ Protective system components securely connected to prevent movement or failure
- ☐ Protective systems inspected daily and free from damage
- ☐ Defective protective systems replaced or corrected
- ☐ Personnel removed from shielding systems when installed, removed, or during vertical movement

PROTECTIVE SYSTEM REMOVAL and BACKFILLING

- ☐ Protective system removal starts and progresses from excavation bottom
- ☐ Protective systems removed slowly and cautiously
- ☐ Temporary structure supports used if failure of remaining components observed
- ☐ Backfilling taking place immediately after protective system removal
- ☐ Backfill certified clean when required by client or local regulation (consult ECC)

EXCAVATING AT HAZARDOUS WASTE SITES

- ☐ Waste disposed of according to Health & Safety Plan and RCRA regulations
- ☐ Appropriate decontamination procedures being followed, per Health & Safety Plan

EXCAVATING AT ORDNANCE EXPLOSIVES SITES

- ☐ OE plan prepared and approved by JV I MEC Safety Officer
- ☐ OE/MEC avoidance provided, access routes cleared, and boundaries marked prior to excavation
- ☐ Personnel remain inside marked boundary
- ☐ Earthmoving equipment does not excavate closer than 1′ (30.5 cm) to anomalies

JV1 Excavation Competent Person Name: _____

JV1 Excavation Competent Person Signature: _____

Date Completed: ___/___/_____

Attachment 5

Drug Free Work Place Program

Drug-Free Workplace Program

Drug-Free Workplace

JV I does not tolerate illegal drugs, or any use of drugs, controlled substances, or alcohol that impairs an employees work performance or behavior. JV I has established a policy that its employees and subcontractors will not be involved in any manner with the unlawful manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace. The use or possession of alcohol in the workplace is also prohibited. Any violation of these prohibitions may result in discipline or immediate discharge. Please reference SOP 105, *Drug-Free Workplace Standard of Practice*, for more information. The following sections describe mandatory program requirements.

Policy Statement

A policy statement is required for the Drug-Free Workplace Program. The policy statement should detail prohibited conduct and ramifications, and:

Prohibit drug, alcohol, and/or controlled substances use or abuse

Prohibit involvement in the manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace

Describe disciplinary actions

Stipulate that subcontractor will pay for all testing

Subcontractor Management

All lower-tiered subcontractors must comply with the provisions of this program.

If a subcontractor's employee has a confirmed positive test result, the subcontractor is required to notify JV I of test result within 24 hours and provide written documentation that the employee has been removed from the site.

Employees testing positive will be removed from the JV I project and not allowed to return for a minimum of six months, and then only upon providing a negative drug screen result.

Subcontractor is responsible for maintaining their own records. JV I requires that the subcontractor submit the names of their employees who have confirmed negative test results on company letterhead, certifying that the employees have met the Drug-Free Workplace Program requirements. JV I reserves the right to audit the subcontractor's program and records at any time.

Site visitors are not required to be drug tested but must be escorted by someone who has been tested. Site visitors are employees who visit a site for a day or less and who are accompanied by a site manager/supervisor. Site visitors are employees who observe the project and are not exposed to significant HS&E hazards. The SC-C must be involved in determining whether an employee is considered a site visitor.

Drug and Alcohol Testing

Testing will be conducted for all substances listed below. If the results exceed the level list, a confirmation sample will be conducted with a gas chromatography/mass spectrometry (GC/MS). If the GC/MS levels exceed those listed, the results will be reported to the Medical Review Officer (MRO).

TABLE 7-1
Drug Levels

Drug	EMIT	GC/MS
Amphetamines	1000	500
Barbiturates	300	150
Benzodiazepines	300	150
Cocaine	300	150
Marijuana	50	15
Methadone	300	200
Methaqualone	300	200
Opiates	300	300
PCP	25	25
Propoxyphene	300	200

An alcohol test is considered positive if levels exceed 0.01 by breath alcohol testing.

Prescription and Non-Prescription Drugs

Employees using prescription or non-prescription drugs that could impair their functions on the project are required to notify the employer in advance of such drug use.

Failure to report prescription and non-prescription drugs as required above, illegally obtaining the substance, or use that is inconsistent with the prescription or label may be subject to disciplinary action.

Types of Testing

General Requirements

Pre-hire, pre-assignment and random testing will only entail drug testing, while all other types of testing must include drug and alcohol testing.

Employees who refuse to submit to drug or alcohol testing will be treated as if they tested positive and will be disciplined accordingly.

Prior to drug or alcohol testing, the employee must sign a consent form. Copies of this form must be maintained on file by the subcontractor.

A candidate will be eliminated from employment consideration for tampering with, altering, or attempting to create a false negative result.

Pre-Hire, Pre-Assignment Testing

Employees working on the Project are required to submit to a pre-assignment test for drugs. The test must be taken within 30 days of the employee's arrival date at the project.

Subcontractor is responsible for maintaining their own records. JV I requires that the subcontractor submit the names of their employees who have confirmed negative test results on company letterhead, certifying that the employees have met the Drug-Free Workplace Program requirements. JV I reserves the right to audit the subcontractor's program and records at any time.

A positive test for a potential new hire or existing employee will result in eliminating the person for consideration for assignment to the project.

Applicants and existing employees who do not successfully pass the drug test may be reconsidered for assignment to the project after 6 months.

Random Testing

A minimum of 10 percent of the employers workforce will be sampled on a monthly basis and a random selection process must be implemented that ensures employees have an equal chance of being selected.

When random testing is performed, no advance notice of testing will be given, and employees who are selected will be required to submit immediately to the test.

An employee who does not test within the required timeframe (4 hours from notification) will be treated as if they tested positive and must be removed from the project immediately.

Post-Incident Testing

At a minimum, post-incident testing is required following an incident on the project that results in an injury in the course of employment requiring treatment from a doctor, or following an incident that results in property damage over US $5,000.

Post-incident testing may be required under other circumstances as dictated by the CM, PM, HSM, HSO , or MEC Support Officer.

Post-incident testing will include both drug and alcohol testing.

Cause or Reasonable Suspicion Testing

When the company or JV I believe there is cause for reasonable suspicion that an employee has taken drugs or consumed alcohol while at work or returned to duty with drugs or alcohol in their body, the employee will be required to immediately submit to drug and/or alcohol tests.

Management must approve “for cause” or “reasonable suspicion” testing prior to requiring an employee to submit to the test.

The subcontractor must maintain written documentation that supports the need for reasonable suspicion testing.

Employees who are required to submit to reasonable suspicion testing will be entitled to request the presence of a Union steward, provided a Union steward is readily available (within one hour or less) and the circumstances allow. The employee’s employer will be responsible for contacting the craft steward.

Employees who are required to submit to reasonable suspicion testing must submit to the test immediately after the determination has been made. Employees are prohibited from transporting themselves to the collection site.

For cause testing will include both drug and alcohol testing.

Rehabilitation Follow-Up Testing

If an employee enters a rehabilitation program, they will be subject to periodic testing for a period of up to 2 years upon their return to work.

The company will follow the MRO-recommended frequency for all follow-up testing.

Re-testing

A dilute sample will be immediately re-tested. The employee's supervisor must escort the employee to the collection site for re-sampling.

The employee must be required to submit to the escorted test without prior warning.

A refusal to retest under these conditions will be considered a positive result and will be disciplined accordingly.

Notification of Results

Positive test results must be reported to JV I within 24 hours of notification from laboratory.

Employee's drug screen result must be kept confidential. Only company individuals with a work-related need to know will be given the results

Searches and Inspections

The subcontractor and JV I must be able to conduct searches of project locations (vehicles, lockers, desks, filing cabinets, or equipment owned or being operated by subcontractor personnel) and employee's personal property (briefcases, purses, backpacks, coats, or vehicles). Employees and their property will be searched by local law enforcement.

JV I must be notified prior to conducting a search.

Employees must sign a search consent and documentation form prior to having a search conducted of the employee's personal property. The subcontractor is responsible for maintaining this form which will also document findings of the search.

The employee will be entitled to request the presence of a Union steward, provided a Union steward is readily available (1 hour or less) and the circumstances allow.

A refusal to submit to, or cooperate with a search, will result in immediate removal from the project site.

Disciplinary Actions

Employees who test positive for drugs or alcohol will be immediately removed from the project.

The company will determine appropriate action, including the level of discipline which includes actions ranging from providing an opportunity for entry into a rehabilitation or counseling program to suspension or dismissal.

Drug Program Service Provider

Positive and/or inconclusive drug screen results must be reviewed by a licensed MRO.

The laboratory providing drug screen analysis must meet all federal, state, and local licensing requirements to provide drug screen analysis.

Employee Education

Employees and supervisors must be provided with a Drug-Free Workplace Program and an Alcohol Education Awareness Program.

Attachment 6

Material Safety Data Sheets
(provided onsite)

Attachment 7

Chemical Specific Training Form

CHEMICAL-SPECIFIC TRAINING FORM

Location:	Task Order:
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC will use the product MSDS to provide the following information concerning each of the products listed above.

☐ Physical and health hazards

☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)

☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants will have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and JV I's written hazard communication program will be made available for employee review in the facility/project hazard communication file.

Attachment 8

Project-Specific Chemical Product Hazard Communication Form H&S Forms/Permits and Other Pertinent Information

NIOSH Pocket Guide to Chemical Hazards

Coal tar pitch volatiles

CAS 65996-93-2

RTECS GF8655000

Synonyms & Trade Names
Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a) pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]

DOT ID & Guide

Exposure Limits

NIOSH REL: Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction) See Appendix A See Appendix C

OSHA PEL: TWA 0.2 mg/m^3 (benzene-soluble fraction) [1910.1002] See Appendix C

IDLH Ca [80 mg/m^3] See: 65996932

Conversion

Physical Description
Black or dark-brown amorphous residue.

Properties vary depending upon the specific compound.			

Combustible Solids

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
OSHA 58
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: No recommendation
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Dermatitis, bronchitis, [potential occupational carcinogen]

Target Organs respiratory system, skin, bladder, kidneys

Cancer Site [lung, kidney & skin cancer]

See also: INTRODUCTION See ICSC CARD: 1415 See MEDICAL TESTS: 0054

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Aluminum

CAS 7429-90-5

Al

RTECS BD033

Synonyms & Trade Names
Aluminium, Aluminum metal, Aluminum powder, Elemental aluminum

DOT ID & Gui
1309 170 (powd
1396 138 (powd
9260 169 (molte

Exposure Limits

NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)

OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)

IDLH N.D. See: IDLH INDEX

Conversion

Physical Description
Silvery-white, malleable, ductile, odorless metal.

MW: 27.0	BP: 4221°F	MLT: 1220°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.70
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid, finely divided dust is easily ignited; may cause explosions.

Incompatibilities & Reactivities
Strong oxidizers & acids, halogenated hydrocarbons [Note: Corrodes in contact with acids & other metals. Ignition may o
are mixed with halogens, carbon disulfide, or methyl chloride.]

Measurement Methods
NIOSH 7013, 7300, 7301, 7303; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately

Breathing: Fresh air

Respirator Recommendations Not available.
Important additional information about respirator selection

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0988 See MEDICAL TESTS: 0011

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Antimony

CAS 7440-36-0

Sb

RTECS CC402

Synonyms & Trade Names
Antimony metal, Antimony powder, Stibium

DOT ID & Gui
1549 157 (inorga compounds, n.o.
2871 170 (powd
3141 157 (inorga compounds, n.o.

Exposure Limits

NIOSH REL*: TWA 0.5 mg/m^3 [*Note: The REL also applies to other antimony compo

OSHA PEL*: TWA 0.5 mg/m^3 [*Note: The PEL also applies to other antimony compou

IDLH 50 mg/m^3 (as Sb) See: 7440360

Conversion

Physical Description
Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder.

MW: 121.8	BP: 2975°F	MLT: 1166°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 6.69
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame.

Incompatibilities & Reactivities
Strong oxidizers, acids, halogenated acids [Note: Stibine is formed when antimony is exposed to nascent (freshly formed

Measurement Methods
NIOSH 7301, 7303, P&CAM261 (II-4); OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 12.5 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

Up to 25 mg/m^3:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o
pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi
mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach
insomnia; anorexia; unable to smell properly

Target Organs Eyes, skin, respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0775 See MEDICAL TESTS: 0016

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Arsenic (inorganic compounds, as As)

CAS 7440-38-2

As (metal)

RTECS CG052

Synonyms & Trade Names

Arsenic metal: Arsenia
Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except ARSINE.]

DOT ID & Gu
1558 152 (metal
1562 152 (dust)

Exposure Limits

NIOSH REL: Ca C 0.002 mg/m^3 [15-minute] See Appendix A

OSHA PEL: [1910.1018] TWA 0.010 mg/m^3

IDLH Ca [5 mg/m^3 (as As)] See: 7440382

Conversion

Physical Description

Metal: Silver-gray or tin-white, brittle, odorless solid.

MW: 74.9	BP: Sublimes	MLT: 1135°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.73 (met
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.

Incompatibilities & Reactivities

Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]

Measurement Methods

NIOSH 7300, 7301, 7303, 7900, 9102; OSHA ID105
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)

Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)

Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canis N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self- breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, skin and/or eye contact ingestion

Symptoms Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irri hyperpigmentation of skin, [potential occupational carcinogen]

Target Organs Liver, kidneys, skin, lungs, lymphatic system

Cancer Site [lung & lymphatic cancer]

See also: INTRODUCTION See ICSC CARD: 0013 See MEDICAL TESTS: 0017

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Barium sulfate

CAS 7727-43-7

$BaSO_4$

RTECS CR060

Synonyms & Trade Names
Artificial barite, Barite, Barium salt of sulfuric acid, Barytes (natural)

DOT ID & Gui
1564 154 (bariur n.o.s.)

Exposure Limits	**NIOSH REL**: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)

IDLH N.D. See: IDLH INDEX

Conversion

Physical Description
White or yellowish, odorless powder.

MW: 233.4	BP: 2912°F (Decomposes)	MLT: 2876°F	Sol(64°F): 0.000
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 4.25-4.5
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Phosphorus, aluminum [Note: Aluminum in the presence of heat can cause an explosion.]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: No recommendation
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations Not available.
Important additional information about respirator selection

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, upper respiratory system; benign pneumoconiosis (baritosis)

Target Organs Eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 0827 See MEDICAL TESTS: 0021

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

CONTENTS

Summary
What is boron?
What happens to boron when it enters the environment?
How might I be exposed to boron?
How can boron affect my health?
How likely is boron to cause cancer?
Is there a medical test to show whether I've been exposed to boron?
Has the federal government made recommendations to protect human health?
Glossary
References
Contact Information

RELATED RESOURCES

ToxFAQ™ 47k
ToxFAQ™ en Español 29k
Public Health Statement 80k
Toxicological Profile 1.5MB

A-Z INDEX

A B C D E
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ATSDR RESOURCES

ToxFAQs™
ToxFAQs™ en Español
Public Health Statements
Toxicological Profiles
Minimum Risk Levels
MMGs
MHMIs
Interaction Profiles
Priority List of Hazardous Substances

September 1995

ToxFAQs™ for Boron and Compounds

(Boro)

CAS# 7440-42-8

This fact sheet answers the most frequently asked health questions about boron. For more information, you may call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to boron occurs in the workplace or from using certain consumer products. Breathing moderate levels of boron irritates the nose, throat, and eyes. This chemical has been found in at least 142 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is boron?

Boron is a compound that occurs in nature. It is often found combined with other substances to form compounds called borates. Common borate compounds include boric acid, salts of borates, and boron oxide.

Several companies in the United States produce most of the world's borates by processing boron compounds. Borates are used mostly to produce glass. They are also used in fire retardants, leather tanning industries, cosmetics, photographic materials, soaps and cleaners, and for high-energy fuel. Some pesticides used for cockroach control and some wood preservatives also contain borates.

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What happens to boron when it enters the environment?

- Boron is released to the environment from natural sources such as oceans, volcanoes, and geothermal steam.
- Boron is also released from industries that use it.
- No information is available on how long boron remains in air, water, or soil.

Division of Toxicology

- Boron does not appear to accumulate in fish or other organisms in water.
- Boron accumulates in plants and is found in foods, mainly fruits and vegetables.

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How might I be exposed to boron?

- In air, water, and food at low levels.
- Drinking water that contains it from areas where boron is found. naturally at high levels in the earth.
- Eating foods containing high levels.
- Working in borax mining and refining plants and at sites where boric acid is manufactured.
- Using consumer products that contain it, such as cosmetics and laundry products.

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How can boron affect my health?

There is little information on the health effects of long-term exposure to boron. Most of the studies are on short-term exposures.

Breathing moderate levels of boron can result in irritation of the nose, throat, and eyes. Reproductive effects, such as low sperm count, were seen in men exposed to boron over the long-term. Animal studies have shown effects on the lungs from breathing high levels of boron.

Ingesting large amounts of boron over short periods of time can harm the stomach, intestines, liver, kidney, and brain. Animal studies of ingestion of boron found effects on the testes in male animals. Birth defects were also seen in the offspring of female animals exposed during pregnancy.

We don't know what the effects are in people from skin contact with boron. Animal studies have found skin irritation when boron was applied directly to the skin.

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How likely is boron to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified boron as to its human carcinogenicity.

One animal study found no evidence of cancer after lifetime exposure to boric acid in food. No human studies are available.

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Is there a medical test to show whether I've been exposed to boron?

Tests are available to measure boron levels in blood and urine. These tests must be done shortly after exposure, because most excess boron leaves the body through the urine within a few days of exposure.

These tests are not usually performed in doctors' offices because special equipment is needed to conduct them. It is not known whether boron levels measured in the body can be used to predict whether health problems will occur.

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Has the federal government made recommendations to protect human health?

The EPA allows no more than 30 parts of boron per million parts of cottonseed oil (30 ppm) and 8 ppm of boron in or on citrus fruits.

The EPA requires that discharges or spills into the environment of 100 pounds of more of boron trichloride and boron trifluoride be reported.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 15 milligrams per cubic meter (15 mg/m^3) for boron oxide dust in workplace air for an 8-hour workday, 40-hour workweek. The National Institute for Occupational Safety and Health (NIOSH) currently recommends an occupational exposure limit of 10 mg/m^3 for boron oxide dust.

NIOSH also recommends that 25 ppm boron trifluoride be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

The Food and Drug Administration (FDA) allows no more than 310 ppm of boron as a food additive.

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Glossary

Carcinogenicity: Ability to cause cancer.

Ingesting: Taking food or drink into your body.

Long-term: Lasting one year or longer.

Milligram (mg): One thousandth of a gram.

Pesticides: Chemicals used to kill pests.

ppm: Parts per million.

Short-term: Lasting 14 days or less.

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References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological Profile for boron. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333
Phone: 1-888-42-ATSDR (1-888-422-8737)
FAX: (770)-488-4178
Email: ATSDRIC@cdc.gov

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Cadmium dust (as Cd)

CAS 7440-43-9

Cd (metal)

RTECS EU980

Synonyms & Trade Names
Cadmium metal: Cadmium
Other synonyms vary depending upon the specific cadmium compound.

DOT ID & Gui
2570 154 (cadmi

Exposure Limits

NIOSH REL*: Ca See Appendix A [*Note: The REL applies to all Cadmium compound

OSHA PEL*: [1910.1027] TWA 0.005 mg/m^3 [*Note: The PEL applies to all Cadmium · Cd).]

IDLH Ca [9 mg/m^3 (as Cd)] See: IDLH INDEX

Conversion

Physical Description
Metal: Silver-white, blue-tinged lustrous, odorless solid.

MW: 112.4	BP: 1409°F	MLT: 610°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.65 (met
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but will burn in powder form.

Incompatibilities & Reactivities
Strong oxidizers; elemental sulfur, selenium & tellurium

Measurement Methods
NIOSH 7048, 7300, 7301, 7303, 9102; OSHA ID121, ID125G, ID189, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: Daily
Remove: No recommendation
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positiv mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion

Symptoms Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath th pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, prot anemia; [potential occupational carcinogen]

Target Organs respiratory system, kidneys, prostate, blood

Cancer Site [prostatic & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0020 See MEDICAL TESTS: 0035

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NPG Home | Introduction | Synonyms & Trade Names | Chemical Names | CAS Numbers | RTECS Numbers | Appendices | Se

Calcium carbonate

CAS 1317-65-3

$CaCO_3$

RTECS EV958

Synonyms & Trade Names
Calcium salt of carbonic acid [Note: Occurs in nature as as limestone, chalk, marble, dolomite, aragonite, calcite & oyster shells.]

DOT ID & Gu

Exposure Limits

NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)

OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)

IDLH N.D. See: IDLH INDEX

Conversion

Physical Description
White, odorless powder or colorless crystals.

MW: 100.1	BP: Decomposes	MLT: 1517-2442°F (Decomposes)	Sol: 0.001%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.7-2.95
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Acids, alum, ammonium salts, mercury & hydrogen, fluorine, magnesium

Measurement Methods
NIOSH 7020, 7303; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Fresh air

Respirator Recommendations Not available.
Important additional information about respirator selection

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; cough

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 1193

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Chromium(III) compounds (as Cr)

CAS

RTECS

DOT ID & Gui

Synonyms & Trade Names
Synonyms vary depending upon the specific Chromium(III) compound. [Note: Chromium(III) compounds include soluble chromic salts.]

Exposure Limits

NIOSH REL: TWA 0.5 mg/m^3 See Appendix C

OSHA PEL: TWA 0.5 mg/m^3 See Appendix C

IDLH 25 mg/m^3 [as Cr(III)] See: cr3m3

Conversion

Physical Description
Appearance and odor vary depending upon the specific compound.

Properties vary depending upon the specific compound.

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7024, 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2.5 mg/m^3:
(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.*

Up to 5 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.*
(APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.*

Up to 25 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel

or P filters.
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; sensitization dermatitis

Target Organs Eyes, skin

See also: INTRODUCTION See MEDICAL TESTS: 0052

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Cobalt metal dust and fume (as Co)

CAS 7440-48-4

Co

RTECS GF875

Synonyms & Trade Names
Cobalt metal dust, Cobalt metal fume

DOT ID & Gui

Exposure Limits

NIOSH REL: TWA 0.05 mg/m^3

OSHA PEL†: TWA 0.1 mg/m^3

IDLH 20 mg/m^3 (as Co) See: 7440484

Conversion

Physical Description
Odorless, silver-gray to black solid.

MW: 58.9	BP: 5612°F	MLT: 2719°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.92
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.

Incompatibilities & Reactivities
Strong oxidizers, ammonium nitrate

Measurement Methods
NIOSH 7027, 7300, 7301, 7303, 9102; OSHA ID121, ID125G, ID213
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 0.25 mg/m^3:
(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.

Up to 0.5 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.*
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.*
(APF = 10) Any supplied-air respirator*

Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.*

(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.*
Up to 2.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters.
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Up to 20 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o
pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi
mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; di
fibrosis; respiratory hypersensitivity, asthma

Target Organs Skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0782 See MEDICAL TESTS: 0055

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NIOSH Pocket Guide to Chemical Hazards

Copper (dusts and mists, as Cu)

CAS 7440-50-8

Cu

RTECS GL532

Synonyms & Trade Names
Copper metal dusts, Copper metal fumes

DOT ID & Gui

Exposure Limits

NIOSH REL*: TWA 1 mg/m^3 [*Note: The REL also applies to other copper compounds Copper fume.]

OSHA PEL*: TWA 1 mg/m^3 [*Note: The PEL also applies to other copper compounds copper fume.]

IDLH 100 mg/m^3 (as Cu) See: 7440508

Conversion

Physical Description
Reddish, lustrous, malleable, odorless solid.

MW: 63.5	BP: 4703°F	MLT: 1981°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.94
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but powdered form may ignite.

Incompatibilities & Reactivities
Oxidizers, alkalis, sodium azide, acetylene

Measurement Methods
NIOSH 7029, 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3:
(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.*

Up to 10 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.*
(APF = 10) Any supplied-air respirator*

Up to 25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.*

Up to 50 mg/m^3:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters.
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o
pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi
mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational

Target Organs Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)

See also: INTRODUCTION See ICSC CARD: 0240 See MEDICAL TESTS: 0057

NIOSH Publication No. 2005-151:

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Iron oxide dust and fume (as Fe)

CAS 1309-37-1

Fe_2O_3

RTECS NO74(NO7525000 (fun

Synonyms & Trade Names
Ferric oxide, Iron(III) oxide

DOT ID & Gu
1376 135 (spent

Exposure Limits

NIOSH REL: TWA 5 mg/m^3

OSHA PEL: TWA 10 mg/m^3

IDLH 2500 mg/m^3 (as Fe) See: 1309371

Conversion

Physical Description
Reddish-brown solid. [Note: Exposure to fume may occur during the arc-welding of iron.]

MW: 159.7	BP: ?	MLT: 2664°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.24
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Calcium hypochlorite

Measurement Methods
NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)

Breathing: Respiratory support

Respirator Recommendations NIOSH

Up to 50 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 125 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

Up to 250 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 2500 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation

Symptoms Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis)

Target Organs respiratory system

See also: INTRODUCTION See ICSC CARD: 1577 MEDICAL TESTS: 0122

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Lead

CAS 7439-92-1

Pb

RTECS OF752

Synonyms & Trade Names
Lead metal, Plumbum

DOT ID & Gui

Exposure Limits

NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C [*Note: The REL also applies to oth compounds (as Pb) -- see Appendix C.]

OSHA PEL*: [1910.1025] TWA 0.050 mg/m^3 See Appendix C [*Note: The PEL also ap lead compounds (as Pb) -- see Appendix C.]

IDLH 100 mg/m^3 (as Pb) See: 7439921

Conversion

Physical Description
A heavy, ductile, soft, gray solid.

MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities
Strong oxidizers, hydrogen peroxide, acids

Measurement Methods
NIOSH 7082, 7105, 7300, 7301, 7303, 7700, 7701, 7702, 9100, 9102, 9105; OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH/OSHA

Up to 0.5 mg/m^3:
(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facep quarter-mask respirators. Click here for information on selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

Up to 2.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Up to 100 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hyp

Target Organs Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

See also: INTRODUCTION See ICSC CARD: 0052 See MEDICAL TESTS: 0127

NIOSH Pocket Guide to Chemical Hazards

Magnesite	**CAS** 546-93-0
$MgCO_3$	**RTECS** QM2470000
Synonyms & Trade Names Carbonate magnesium, Hydromagnesite, Magnesium carbonate, Magnesium(II) carbonate [Note: Magnesite is a naturally-occurring form of magnesium carbonate.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, odorless, crystalline powder.

MW: 84.3	BP: Decomposes	MLT: 662°F (Decomposes)	Sol: 0.01%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.96
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Acids, formaldehyde

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Fresh air

Important additional information about respirator selection
Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; cough

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0969

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Manganese compounds and fume (as Mn)

CAS 7439-96-5

Mn (metal)

RTECS OO927

Synonyms & Trade Names
Manganese metal: Colloidal manganese, Manganese-55
Synonyms of other compounds vary depending upon the specific manganese compound.

DOT ID & Gui

Exposure Limits

NIOSH REL*: TWA 1 mg/m^3 ST 3 mg/m^3 [*Note: Also see specific listings for Mangan cyclopentadienyl tricarbonyl, Methyl cyclopentadienyl manganese tricarbonyl, and Mar tetroxide.]

OSHA PEL*: C 5 mg/m^3 [*Note: Also see specific listings for Manganese cyclopentadi and Methyl cyclopentadienyl manganese tricarbonyl.]

IDLH 500 mg/m^3 (as Mn) See: 7439965

Conversion

Physical Description
A lustrous, brittle, silvery solid.

MW: 54.9	BP: 3564°F	MLT: 2271°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.20 (met
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Combustible Solid

Incompatibilities & Reactivities
Oxidizers [Note: Will react with water or steam to produce hydrogen.]

Measurement Methods
NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)

Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 10 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

Up to 50 mg/m^3:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o
pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi
mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel
or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion

Symptoms Parkinson's; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, d
(breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakn
exhaustion); kidney damage

Target Organs respiratory system, central nervous system, blood, kidneys

See also: INTRODUCTION See ICSC CARD: 0174 See MEDICAL TESTS: 0131

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Mercury compounds [except (organo) alkyls] (as Hg)

CAS 7439-97-6

Hg (metal)

RTECS OV455

Synonyms & Trade Names
Mercury metal: Colloidal mercury, Metallic mercury, Quicksilver
Synonyms of "other" Hg compounds vary depending upon the specific compound.

DOT ID & Gu
2809 172 (metal

Exposure Limits

NIOSH REL: Hg Vapor: TWA 0.05 mg/m^3 [skin]
Other: C 0.1 mg/m^3 [skin]

OSHA PEL†: C 0.1 mg/m^3

IDLH 10 mg/m^3 (as Hg) See: 7439976

Conversion

Physical Description
Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds exce alkyls.]

MW: 200.6	BP: 674°F	FRZ: -38°F	Sol: Insoluble
VP: 0.0012 mmHg	IP: ?		Sp.Gr: 13.6 (met
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Liquid

Incompatibilities & Reactivities
Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper

Measurement Methods
NIOSH 6009; OSHA ID140
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations Mercury vapor:
NIOSH

Up to 0.5 mg/m^3:
(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†
(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†

Up to 2.5 mg/m^3:
(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compc concern†

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister provid against the compound of concern†
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPR
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand c pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister provid against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Other mercury compounds:
NIOSH/OSHA

Up to 1 mg/m^3:
(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†
(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†

Up to 5 mg/m^3:
(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compc concern†
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister provid against the compound of concern†
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPR
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister provid against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, inso indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, wei proteinuria

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys

See also: INTRODUCTION See ICSC CARD: 0056 See MEDICAL TESTS: 0136

NIOSH Publication No. 2005-151:

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Molybdenum

CAS 7439-98-7

Mo

RTECS QA468

Synonyms & Trade Names
Molybdenum metal

DOT ID & Gu

Exposure Limits

NIOSH REL: See Appendix D

OSHA PEL*†: TWA 15 mg/m^3 [*Note: The PEL also applies to other insoluble molybd compounds (as Mo).]

IDLH 5000 mg/m^3 (as Mo) See: 7439987

Conversion

Physical Description
Dark gray or black powder with a metallic luster.

MW: 95.9	BP: 8717°F	MLT: 4752°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 10.28
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid in form of dust or powder.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately

Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations OSHA

Up to 75 mg/m^3:
(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.

Up to 150 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 375 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

Up to 750 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel

or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Up to 5000 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, nose, throat; anorexia, diarrhea, weight loss; listlessness; liver, kidney damage

Target Organs Eyes, respiratory system, liver, kidneys

See also: INTRODUCTION See MEDICAL TESTS: 0150

NIOSH Publication No. 2005-151:

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Naphthalene

CAS 91-20-3

$C_{10}H_8$

RTECS QJ052

Synonyms & Trade Names
Naphthalin, Tar camphor, White tar

DOT ID & Gui
1334 133 (crude
2304 133 (molte

Exposure Limits

NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)

OSHA PEL†: TWA 10 ppm (50 mg/m^3)

IDLH 250 ppm See: 91203

Conversion 1 ppm = 5.24 mg/m^3

Physical Description
Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]

MW: 128.2	BP: 424°F	MLT: 176°F	Sol: 0.003%
VP: 0.08 mmHg	IP: 8.12 eV		Sp.Gr: 1.15
Fl.P: 174°F	UEL: 5.9%	LEL: 0.9%	

Combustible Solid, but will take some effort to ignite.

Incompatibilities & Reactivities
Strong oxidizers, chromic anhydride

Measurement Methods
NIOSH 1501; OSHA 35
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Molten flush immediately/solid-liquid soap wa
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm:
(APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for information on selection of N, R, or P
(APF = 10) Any supplied-air respirator*
Up to 250 ppm:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N10 P100 filter. Click here for information on selection of N, R, or P filters.
(APF = 25) Any powered air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency parti
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, se breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, c

Target Organs Eyes, skin, blood, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0667 See MEDICAL TESTS: 0152

NIOSH Publication No. 2005-151:

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Nickel metal and other compounds (as Ni)

CAS 7440-02-0

Ni (Metal)

RTECS QR595

Synonyms & Trade Names
Nickel metal: Elemental nickel, Nickel catalyst
Synonyms of other nickel compounds vary depending upon the specific compound.

DOT ID & Gui

Exposure Limits

NIOSH REL*: Ca TWA 0.015 mg/m^3 See Appendix A [*Note: The REL does not apply carbonyl.]

OSHA PEL*†: TWA 1 mg/m^3 [*Note: The PEL does not apply to Nickel carbonyl.]

IDLH Ca [10 mg/m^3 (as Ni)] See: 7440020

Conversion

Physical Description
Metal: Lustrous, silvery, odorless solid.

MW: 58.7	BP: 5139°F	MLT: 2831°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.90 (Met
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Combustible Solid; nickel sponge catalyst may ignite SPONTANEOUSLY in air.

Incompatibilities & Reactivities
Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate

Measurement Methods
NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)

Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]

Target Organs Nasal cavities, lungs, skin

Cancer Site [lung and nasal cancer]

See also: INTRODUCTION See ICSC CARD: 0062 See MEDICAL TESTS: 0156

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Sodium cyanide (as CN)

CAS 143-33-9

NaCN

RTECS VZ752

Synonyms & Trade Names
Sodium salt of hydrocyanic acid

DOT ID & Gui
1689 157 (solid)
3413 157 (solutic

Exposure Limits

NIOSH REL*: C 5 mg/m^3 (4.7 ppm) [10-minute] [*Note: The REL also applies to other CN) except Hydrogen cyanide.]

OSHA PEL*: TWA 5 mg/m^3 [*Note: The PEL also applies to other cyanides (as CN) e cyanide.]

IDLH 25 mg/m^3 (as CN) See: cyanides

Conversion

Physical Description
White, granular or crystalline solid with a faint, almond-like odor.

MW: 49.0	BP: 2725°F	MLT: 1047°F	Sol(77°F): 58%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.60
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but contact with acids releases highly flammable hydrogen cyanide.

Incompatibilities & Reactivities
Strong oxidizers (such as acids, acid salts, chlorates & nitrates) [Note: Absorbs moisture from the air forming a syrup.]

Measurement Methods
NIOSH 6010, 7904
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 25 mg/m^3:
(APF = 10) Any supplied-air respirator
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand c pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister provid

against the compound of concern and having an N100, R100, or P100 filter. Click here for information on selection of N, I filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; asphyxia; lassitude (weakness, exhaustion), headache, confusion; nausea, vomiting; i respiratory rate; slow gasping respiration; thyroid, blood changes

Target Organs Eyes, skin, cardiovascular system, central nervous system, thyroid, blood

See also: INTRODUCTION See ICSC CARD: 1118

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Potassium cyanide (as CN)

CAS 151-50-8

KCN

RTECS TS875

Synonyms & Trade Names
Potassium salt of hydrocyanic acid

DOT ID & Gu
1680 157 (solid)
3413 157 (solutic

Exposure Limits	NIOSH REL*: C 5 mg/m^3 (4.7 ppm) [10-minute] [*Note: The REL also applies to other CN) except Hydrogen cyanide.]
	OSHA PEL*: TWA 5 mg/m^3 [*Note: The PEL also applies to other cyanides (as CN) e cyanide.]

IDLH 25 mg/m^3 (as CN) See: cyanides

Conversion

Physical Description
White, granular or crystalline solid with a faint, almond-like odor.

MW: 65.1	BP: 2957°F	MLT: 1173°F	Sol(77°F): 72%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.55
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but contact with acids releases highly flammable hydrogen cyanide.

Incompatibilities & Reactivities
Strong oxidizers (such as acids, acid salts, chlorates & nitrates) [Note: Absorbs moisture from the air forming a syrup.]

Measurement Methods
NIOSH 6010, 7904
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 25 mg/m^3:
(APF = 10) Any supplied-air respirator
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister provid

against the compound of concern and having an N100, R100, or P100 filter. Click here for information on selection of N, I filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; asphyxia; lassitude (weakness, exhaustion), headache, con vomiting; increased respiratory rate, slow gasping respiration; thyroid, blood changes

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, thyroid, blood

See also: INTRODUCTION See ICSC CARD: 0671

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Selenium

CAS 7782-49-2

Se

RTECS VS770

Synonyms & Trade Names
Elemental selenium, Selenium alloy

DOT ID & Gui
2658 152 (powd

Exposure Limits

NIOSH REL*: TWA 0.2 mg/m^3 [*Note: The REL also applies to other selenium compou except Selenium hexafluoride.]

OSHA PEL*: TWA 0.2 mg/m^3 [*Note: The PEL also applies to other selenium compou except Selenium hexafluoride.]

IDLH 1 mg/m^3 (as Se) See: 7782492

Conversion

Physical Description

Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.]

MW: 79.0	BP: 1265°F	MLT: 392°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 4.28
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities

Acids, strong oxidizers, chromium trioxide, potassium bromate, cadmium

Measurement Methods

NIOSH 7300, 7301, 7303, 9102, S190 (II-7); OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)

Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Quick drench

First Aid (See procedures)

Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 1 mg/m^3:
(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.*
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering face quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for inform selection of N, R, or P filters.*
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters.
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, ci spleen damage

Target Organs Eyes, skin, respiratory system, liver, kidneys, blood, spleen

See also: INTRODUCTION See ICSC CARD: 0072 See MEDICAL TESTS: 0202

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Silver (metal dust and soluble compounds, as Ag)

CAS 7440-22-4

Ag (metal)

RTECS VW35(

Synonyms & Trade Names
Silver metal: Argentum
Synonyms of soluble silver compounds such as Silver nitrate ($AgNO_3$) vary depending upon the specific compound.

DOT ID & Gu

Exposure Limits

NIOSH REL: TWA 0.01 mg/m^3

OSHA PEL: TWA 0.01 mg/m^3

IDLH 10 mg/m^3 (as Ag) See: IDLH INDEX

Conversion

Physical Description
Metal: White, lustrous solid.

MW: 107.9	BP: 3632°F	MLT: 1761°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 10.49 (m
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid, but flammable in form of dust or powder.

Incompatibilities & Reactivities
Acetylene, ammonia, hydrogen peroxide, bromoazide, chlorine trifluoride, ethyleneimine, oxalic acid, tartaric acid

Measurement Methods
NIOSH 7300, 7301, 9102; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated ($AgNO_3$)
Change: Daily
Provide: Eyewash

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode£
(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter£

Up to 0.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters.
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance

Target Organs Nasal septum, skin, eyes

See also: INTRODUCTION See ICSC CARD: 0810 See MEDICAL TESTS: 0208

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Vanadium dust

CAS 1314-62-1

V_2O_5

RTECS YW24

Synonyms & Trade Names
Divanadium pentoxide dust, Vanadic anhydride dust, Vanadium oxide dust, Vanadium pentaoxide dust
Other synonyms vary depending upon the specific vanadium compound.

DOT ID & Gu
2862 151

Exposure Limits

NIOSH REL*: C 0.05 mg V/m^3 [15-minute] [*Note: The REL applies to all vanadium co except Vanadium metal and Vanadium carbide (see Ferrovanadium dust).]

OSHA PEL†: C 0.5 mg V_2O_5/m^3 (resp)

IDLH 35 mg/m^3 (as V) See: vandust

Conversion

Physical Description
Yellow-orange powder or dark-gray, odorless flakes dispersed in air.

MW: 181.9	BP: 3182°F (Decomposes)	MLT: 1274°F	Sol: 0.8%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.36
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may increase intensity of fire when in contact with combustible materials.

Incompatibilities & Reactivities
Lithium, chlorine trifluoride

Measurement Methods
NIOSH 7300, 7301, 7303, 7504, 9102; OSHA ID185
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH (as V)

Up to 0.5 mg/m^3:
(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facep quarter-mask respirators. Click here for information on selection of N, R, or P filters.*
(APF = 10) Any supplied-air respirator*

Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter*

Up to 2.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel

or P filters.
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Up to 35 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, throat; green tongue, metallic taste, eczema; cough; fine rales, wheezing, bronchitis, d (breathing difficulty)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0596

Project-Specific Chemical Product Hazard Communication Form

This form must be completed prior to performing activities that expose personnel to hazardous chemicals products. Upon completion of this form, the HSO will verify that training is provided on the hazards associated with these chemicals and the control measures to be used to prevent exposure to JV I and subcontractor personnel. Labeling and MSDS systems will also be explained.

Project Name: **Task Order:**

MSDS's will be maintained at the following location(s):

Hazardous Chemical Products Inventory

Chemical	Quantity	Location	MSDS Available	Container labels	
				Identity	Hazard

Refer to SOP HS-107 *Hazard Communication* for more detailed information.

Attachment 9

Biological Hazard Fact Sheets

Tick-Borne Pathogens

There are 6 notifiable tick-borne pathogens that present a significant field hazard, and in some areas account for more than half of our serious field incidents. These procedures should be applied during any field activity – even those field efforts that are predominantly paved but with bordering vegetation.

Hazard Control

The methods for controlling exposure to ticks include, in order of most-preferred to least:

Avoiding tick habitats and ceasing operations in heavily infested areas
Reducing tick abundance through habitat disruption or application of acracide
Personal protection through use of repellants and protective clothing
Frequent tick inspections and proper hygiene

Vaccinations are not available and preventative antibiotic treatment after a bite is generally not recommended.

Avoidance and Reduction of Ticks

To the extent practical, tick habitats should be avoided. In areas with significant tick infestation, consider stopping work and withdrawing from area until adequate tick population control can be achieved. Stopping and withdrawing should be considered as seriously as entering an area without proper energy control or with elevated airborne contaminants – tickborne pathogens present risk of serious illness!

In areas where significant population density or infestation exists, tick reduction should be considered. Tick reduction can be achieved by disrupting tick habitats and/or direct population reduction through the use of tick-toxic pesticides (Damminix, Dursban, Sevin, etc.).

Habitat disruption may include only simple vegetative maintenance such as removing leaf litter and trimming grass and brush. Tick populations can be reduced between 72 and 100% when leaf litter alone is removed. In more heavily infested areas, habitat disruption may include grubbing, tree trimming or removal, and pesticide application (Damminix, Dursban, Sevin, etc.). This approach is practical in smaller, localized areas or perimeter areas that require occasional access. Habitat controls are to be implemented with appropriate health and safety controls, in compliance with applicable environmental requirements, and may be best left to the property owner or tenant, or licensed pesticide vendor. Caution should be exercised when using chemical repellents or pesticides in or around areas where environmental or industrial media samples will be collected for analysis.

Personal Protection

After other prevention and controls are implemented, personal protection is still necessary in controlling exposure to ticks. Personal protection must include all of the following steps:

So that ticks may be seen on your clothing wear light-colored clothing. Full-body New Tyvek (paper-like disposable coveralls) may also be used.
To prevent ticks from getting underneath clothing tuck pant legs into socks or tape to boots.
Wear long-sleeved shirts, a hat, and high boots.
Apply DEET repellent to exposed skin or clothing per product label.
Apply permethrin repellent to the outside of boots and clothing before wearing, per product label.
Frequently check for ticks and remove from clothing.
At the end of the day search your entire body for ticks (particularly groin, armpits, neck and head) and shower.

To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves anytime ticks are handled.

Pregnant individuals and individuals using prescription medications should consult with their physician and/or pharmacists before using chemical repellents. Because human health effects may not be fully known, use of chemical repellents should be kept to a minimum frequency and quantity. Always follow manufacturers' use instructions and precautions. Wash hands after handling, applying, or removing protective gear and clothing. Avoid hand-to-face contact, eating, drinking, smoking, etc. when applying or using repellents. Remove and wash clothes per repellent product label. Chemical repellents should not be used on infants and children.

Vaccinations are generally not available for tick-borne pathogens. Although production of the LYMErix™ lyme disease vaccination has been ceased, vaccination may still be considered under specific circumstances and with concurrence from the consulting physician. Preventative antibiotic treatment in non-ill individuals who have had a recent tick bite is recommended in specific cases only.

Tick Removal

1. Use fine-tipped tweezers or shield your fingers with a tissue, paper towel, or nitrile gloves.

2. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. (If this happens, remove mouthparts with tweezers. Consult your healthcare provider if infection occurs.)

3. Do not squeeze, crush, or puncture the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.

4. Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who remove ticks from domestic animals with unprotected fingers. Children, elderly persons, and immunocompromised persons may be at greater risk of infection and should avoid this procedure.

5. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.

6. You may wish to save the tick for identification in case you become ill. Your doctor can use the information to assist in making an accurate diagnosis. Place the tick in a plastic bag and put it in your freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.

Note: Folklore remedies such as petroleum jelly or hot matches do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided. In addition, a number of tick removal devices have been marketed, but none are better than a plain set of fine tipped tweezers.

First-Aid and Medical Treatment

Tick bites should always be treated with first-aid. Clean and wash hands and disinfect the bite site after removing embedded tick. Consult a healthcare professional if infection or symptoms and effects of tick-borne illnesses are develop.

Medical treatment for tick-borne infections include antibiotics and other medical interventions. Diagnosis of specific illness involves both clinical and laboratory confirmations. Preventative antibiotic treatment in non-ill individuals who have had a recent tick bite is recommended in specific cases only.

Previously infected individuals are not conferred immunity – re-infection from future tick bites can occur even after a person has contracted a tick-borne disease.

Hazard Recognition

An important step in controlling tick related hazards is understanding how to identify ticks, their habitats, their geographical locations, and signs & symptoms of tick-borne illnesses.

Tick Identification

There are five varieties of hard-bodied ticks that have been associated with tick-borne pathogens. These tick varieties include:

- Deer (Black Legged) Tick (eastern and pacific varieties)
- Lone Star Tick
- Dog Tick
- Rocky Mountain Wood Tick

These varieties and their geographical locations are illustrated on the following page.

Tick Habitat

In eastern states, ticks are associated with deciduous forest and habitat containing leaf litter. Leaf litter provides a moist cover from wind, snow, and other elements. In the north-central states, is generally found in heavily wooded areas often surrounded by broad tracts of land cleared for agriculture. On the Pacific Coast, the bacteria are transmitted to humans by the western black-legged (deer) tick and habitats are more diverse. Here, ticks have been found in habitats with forest, north coastal scrub, high brush, and open grasslands. Coastal tick populations thrive in areas of high rainfall, but ticks are also found at inland locations.

Illnesses and Signs & Symptoms

There are six notifiable tick-borne pathogens that cause human illness in the United States. These pathogens may be transmitted during a tick bite – normally hours after attachment. The illnesses, presented in approximate order of most common to least, include:

1. Lyme (bacteria)
2. RMSF (bacteria)
3. Ehrlichiosis (bacteria)
4. STARI (Southern Tick-Associated Rash Illness) (bacteria)
5. Tularemia (Rabbit Fever) (bacteria)
6. Babesia (protozoan parasite)

Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. These illnesses present with some or all of the following signs & symptoms: fever, headache, muscle aches, stiff neck, joint aches, nausea, vomiting, abdominal pain, diarrhea, malaise, weakness, small solid, ring-like, or spotted rashes. The bite site may be red, swollen, or develop ulceration or lesions. A variety of long-term symptoms may result when untreated, including debilitating effects and death.

Poison Oak (Ivy and Sumac too)

Reaction to Poison Oak is an allergic response and ranges from no reaction to a severe “rhus” dermatitis. Rhus is the class of poisonous plants which also includes poison ivy and poison sumac, mango, and other urushiol containing plants. 3 of 4 people will develop dermatitis on contact with urushiol.

Shrubs are usually 12" to 30" high, or a tree-climbing vine, with triple leaflets and short, smooth hair underneath. A project site in Portland had 8’ tall poison oak bushes. Early berries are fuzzy and white; later, dun-colored. Plants are red and dark green in Spring and Summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in Fall, but the plant loses its (yellowed, then brown) leaves in Winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons.

Primary contamination results from contact with bruised or broken plant parts that release "toxicodendrol", an oily resin containing the toxic chemical "urushiol".

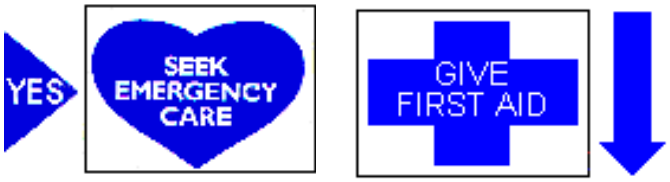
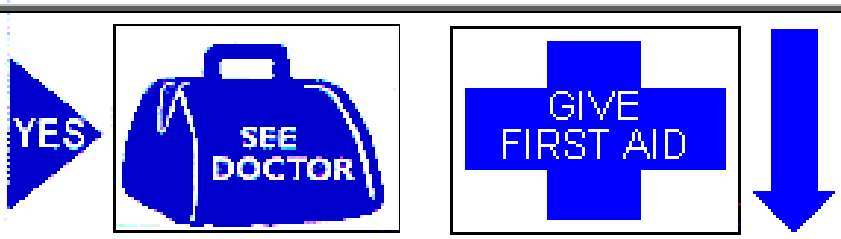
Exposure to Poison Oak is Preventable

Exposure to poison oak often becomes an OSHA recordable illness. The dermatitis is so severe that many people seek medical care and get prescription cortisone creams to reduce the suffering caused by the itch.

Exposure to Poison Oak is not an unavoidable part of working outdoors!

- Identify Poison Oak – The best way to prevent exposure is to recognize the plant and avoid working in areas where poison oak is present.
- If you must work in areas with poison oak, contact you project manager and health and safety manager to determine the best procedures to prevent contamination.
- Contamination with poison oak can happen through several pathways. These include
    - Direct skin contact with any part of the plant.
    - Contact with clothing that has been contaminated
    - Contact from removing shoes that have been contaminated. (your shoes are coated with oil)
    - Sitting in a vehicle that has become contaminated
    - Contact with any objects or tools that have become contaminated.
- If you must work on a site with poison oak the following precautions are necessary.
    - Do not drive vehicles onto the site where it will come into contact with poison oak. Vehicles which need to work in the area, such as drill rigs or heavy equipment must be washed as soon as possible after leaving the site.
    - All tools used in the poison oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus must be decontaminated before they are placed back into the site vehicle. If on-site decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated.
    - Personal protective equipment, including tyvek coveralls, gloves, and boot covers must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle.
    - As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with "Tecnu" or other product designed for removing urushiol. If you do not have Tecnu wash with cold water. Do not take a bath, as the oils can form and invisible film on top of the water and contaminate your entire body upon exiting the bath.
    - Tecnu may also be used to decontaminate equipment.
- If there is exposure use the following first aid procedures, or others you may find to alleviate the pain and itch.

Poison Oak First Aid

Are there any of these problems? • Swelling in the throat, tongue and/or lips • A hard time breathing or swallowing • Weakness, dizziness • Bluish lips and mouth • Unconsciousness	
	Use emergency kit with adrenalin, if available, and Get Emergency Care.
Do you have any of these problems? • Skin that is very bright red. • Pus. • Rash that has spread to the mouth, eyes or genitals. • Rash on large areas of the body or the face.	

	See Doctor and Give first aid before seeing doctor:
	• Take a hot shower (only after rash develops), put the rash area in hot water or pour hot water over it. Make sure the water is not too hot to burn the skin. The hot water causes itching at first, but brings relief later. Do not use soap.
	• Take an over-the-counter antihistamine, such as Benadryl, as stated on the label.
	• For weeping blisters:
	  • Mix 2 teaspoons of baking soda in 1 quarter (4 cups) of water.
	  • Dip squares of gauze in this mixture.
	  • Cover the blisters with the wet gauze for 10 minutes, four times a day. (Do not apply this to the eyes.)

Self-Care/First Aid

- Make sure you wash all clothes and shoes with hot water and a strong soap. Also, bathe pets who have come in contact with poison ivy, oak or sumac. The sap can stay on pets for many days.
- Keep your hands away from your eyes, mouth and face.
- Do not scratch or rub the rash.
- Apply any of these to the skin rash:
- Calamine (not Caladryl) lotion
- Zinc oxide ointment
- Paste made with baking soda - mix 3 teaspoons of baking soda with 1 teaspoon of water
- Take an over-the-counter antihistamine such as Benadryl, as stated on the label

If self-care/first aid measures don't bring relief, call your doctor.

Attachment 10

Activity Hazard Analyses (AHAS)

Task Order 059
Site 19 – Removal Action
St. Juliens Creek Annex
Chesapeake, VA

ACTIVITY HAZARD ANALYSIS FOR MOBILIZATION/DEMOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Mobilization/ Demobilization	Slips, Trips, Falls	• Clear walkways work areas of objects • Identify uneven surfaces or ground protrusions • Institute and maintain good housekeeping practices. • Observe/avoid debris in a work area. • Walk or climb only on surfaces designed for personnel access. • Be aware of poor footing and potential slipping and tripping hazards in the work area (wet/steep slopes, holes, ditches, rip rap, utilities).Observe and avoid areas of unprotected holes, ramps and ground penetrations or protrusions (stumps, roots, holes curbs, utility structures etc). Employees walking in ditches, swales and other drainage structures adjacent to roads, across undeveloped land or in controlled industrial work/process areas must use caution to prevent slips and falls, which could result in twisted or sprained ankles, knees, and backs. • If steep/uneven terrain must be negotiated, sturdy hard toe work boots that provide ankle support shall be used. Work boots shall be in accordance with ANSI.	Standard Level D PPE * *Reflective vests/ high visibility clothing, hard hat, safety glasses and ANSI rated work boots/shoes, hearing protection $\geq$ 85 dbA, hand protection as dictated by task	Visual Inspection
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests or high visibility clothing. • Isolate equipment swing areas • Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator • Understand and review hand signals • Ensure equipment has operable back-up alarms • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Ensure heavy equipment operator has spotter for obstructed views and backing up • Avoid positioning between fixed objects and operating equipment • Maintain/use PPE	Standard Level D PPE or	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR MOBILIZATION/DEMOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Mobilization/ Demobilization (Cont.)	Spills	• Site Specific HAZCOM training for incident spills. Only trained personnel, with proper PPE, monitoring equipment and engineering controls to respond. • Clean up spills before initiating maintenance • Review maintenance procedures for safety practices • Use funnels and nozzles during equipment fueling operations • Maintain spill kit and contact list of spill response subcontractors • Maintain on-site spill response Kit	Chemical resistant gloves, safety glasses/goggles/face shields, over boots, disposable coveralls, respiratory protection (as needed)	PID 4 gas meter
	Pinch points	• Review equipment adjustment procedures, identify pinch points • Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles	Leather gloves plus Standard Level D PPE or in accordance w/ HSP	Visual Inspection
	Handling Heavy Objects	• Observe proper lifting techniques (knees not back) • Obey sensible lifting limits (50 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Avoid manual lifting/carrying tasks • Utilize only tagged, load rated rigging by a competent person	Lifting Braces, leather gloves plus Standard Level D PPE	Visual Inspection
	Equipment failure	• Perform daily maintenance inspections on operating equipment • Avoid/take care around pressurized lines/hoses • Competent authorized operators only	Standard Level D PPE	Visual Inspection
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Avoid razor knives. • Cut away from the body and never towards another worker. • Maintain all hand and power tools in a safe condition	Leather gloves plus Standard Level D PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR MOBILIZATION/DEMOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Mobilization/ Demobilization (Cont.)	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Hearing protection Standard level D PPE	Noise Dosimeter
	Walking on machine surfaces (heavy equipment)	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Avoid sudden awkward motions (pulling/jerking fuel hoses)	Standard level D PPE	Visual Inspection
	High Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for heat stress in accordance with HSP • Provide proper work break or warming regiments	Light colored cotton clothing when possible, cooling vests with Mod. D or C PPE	Meteorological Equipment
	Low Ambient Temperature	• Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather. • Frequent intake of non-caffeinated fluids to maintain body core temperature. • Frequent intake of non- caffeinated to prevent dehydration. • Obtain and review weather forecast— be aware of predicted weather systems. • Observe one (buddy system) another for initial signs of cold-related disorders. • Frequent observance of Wind Chill Chart (HSP section 3.11.12) to assist with work warming regiment determination and frostbite avoidance	Standard PPE w/ hard hat liners, layered clothing w/ polypropylene/cotton (moisture wicking) materials adjacent to skin with thermal over layers, wind/moisture resistant coats/pants gloves.	Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR MOBILIZATION/DEMOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Mobilization/ Demobilization (Cont.)	Other	• Prohibit horseplay on all project sites • Review rules about horseplay with JV I personnel and subcontractor supervisors. • Remind workers not to respond/participate in horseplay started by others. • Personnel to observe drug free work place policy. • Unsafe acts to be reported to project management and safety represents for evaluation and/or corrective action. • Employees to represent themselves in a professional manner and appropriate work attire during work hours/on-site.	NA	Visual Inspection
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Hand tools • Excavator • Load rated (tagged or labeled) chain w/ D ring or sling capable of carrying suspended loads • Fire Extinguishers • First Aid Kits		• Daily equipment inspections as per manufacturers requirements and equipment maintenance • Weekly Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers) • Visual Inspections of designated work areas	• Review AHA/PTSP with all task personnel. • Review HSP. • Review operations/safety manuals for all equipment utilized. • Training per 29 CFR 1910.120 or other training as required for SoW tasks. • Behavior Based Loss Prevention Training.	

Task Order 059
Site 19 – Removal Action
St. Juliens Creek Annex
Chesapeake, VA

	PRINT	SIGNATURE	
Supervisor Name:	_____	_____	**Date/Time:**_____
Safety Officer Name:	_____	_____	**Date/Time:**_____
Site Personnel:	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
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	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____

Task Order 059
Site 19 – Removal Action
St. Juliens Creek Annex
Chesapeake, VA

ACTIVITY HAZARD ANALYSIS – SOIL CHARACTERIZATION SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Characterization Sampling	Slips, Trips, Falls	• Clear walkways work areas of objects • Identify uneven surfaces or ground protrusions • Institute and maintain good housekeeping practices. • Observe/avoid debris in a work area. • Walk or climb only on surfaces designed for personnel access. • Be aware of poor footing and potential slipping and tripping hazards in the work area (wet/steep slopes, holes, ditches, rip rap, utilities).Observe and avoid areas of unprotected holes, ramps and ground penetrations or protrusions (stumps, roots, holes curbs, utility structures etc). Employees walking in ditches, swales and other drainage structures adjacent to roads, across undeveloped land or in controlled industrial work/process areas must use caution to prevent slips and falls, which could result in twisted or sprained ankles, knees, and backs. • If steep/uneven terrain must be negotiated, sturdy hard toe work boots that provide ankle support shall be used. Work boots shall be in accordance with ANSI.	Level D Modified PPE * *Hardhats & safety glasses, Sturdy Hard toe work boots, Chemical resistant gloves, boot covers	Visual Inspection
	Visible Lighting	• Perform tasks in daylight hours whenever possible. • Do not enter poorly lit areas without first providing portable illumination. • Do not use non-explosion proof lighting/equipment in areas of flammable or combustible gases or liquids. • Use reflective vests/high visibility clothing in high traffic areas or areas with heavy equipment.	Level D Modified PPE	Visual Inspection
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Do not use razor knives. • Cut away from the body and never towards another worker. • Maintain all hand and power tools in a safe condition	Level D Modified PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS – SOIL CHARACTERIZATION SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Characterization Sampling (cont.)	High Ambient Temperature	• Provide fluids to prevent worker dehydration. • Monitor for heat stress in accordance with HSP. • Provide proper work break or warming regiments. • Use buddy system for monitoring of team members.	Level D Modified PPE Light colored cotton clothing when possible, cooling vests with Mod. D or C PPE	Meteorological Equipment
	Low Ambient Temperature	• Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather. • Frequent intake of warm non-caffeinated fluids to maintain body core temperature. • Frequent intake of non- caffeinated liquids to prevent dehydration. • Obtain and review weather forecast— be aware of predicted weather systems. • Observe one (buddy system) another for initial signs of cold-related disorders. • Frequent observance of Wind Chill Chart (HSP section 3.2.4) to assist with work warming regiment determination and frostbite avoidance	Standard PPE w/ following as applicable. hard hat liners/hats, layered clothing w/ polypropylene/cotton (moisture wicking) materials adjacent to skin with thermal over layers, wind/moisture resistant coats/pants gloves	Meteorological Equipment
	Biological	• Observe ground surfaces especially in wet or grassy areas for evidence and presence of snakes (poisonous). • Observe ground surfaces or surrounding vegetation or structures for presence fire ants, spiders, bee/wasp hives rabid animals etc. • Observe areas for presence of stinging insects. **Notify supervisors of known allergies to stinging insects and location of antidotes.** • Use insect repellant. • Avoid exposure to blood bourne pathogens • Check body and clothing for ticks, chiggers, spiders.	Level D Modified PPE Insect repellant, appropriate work attire (clothes sufficiently covering body). w/	Visual Inspection

ACTIVITY HAZARD ANALYSIS – SOIL CHARACTERIZATION SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Characterization Sampling (cont.)	Handling Heavy Objects	• JV-1 or subcontract personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities such that the JV-1 may evaluate safe operational procedures with regard to the required task. • When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports should be considered. • Plan storage and staging to minimize lifting or carrying distances. • Split heavy loads into smaller loads. • Have someone assist with the lift— especially for heavy (> 50lbs.) or awkward loads. (Note: If JV-1 employee is not capable of carrying 50 lbs. or less, seek assistance.). • Make sure the path of travel is clear prior to the lift. • Do not lift manhole covers, open/lift hatches or other access points to vessels, tanks or subsurface structures without proper authorization to do so, proper tools and proper personnel protective equipment. • Use carts, hand trucks additional personnel etc. to move large, awkward loads. • Avoid carrying heavy objects above shoulder level • Utilize only tagged, load rated lifting. • Review load rating capacity of lifting device if utilized a “choker” or “basket” application. • Never walk/be positioned under or within swing radius a suspended load.	Level D Modified PPE, cut resistant gloves	Visual Inspection

ACTIVITY HAZARD ANALYSIS – SOIL CHARACTERIZATION SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Characterization Sampling (cont.)	General Site Control	• Ensure new site workers review and understand HSP requirements. Ensure JV 1 personnel have received the Behavior Based Loss Prevention System (BBLPS) Training. • Know how an emergency should be reported. **SJCA Facility EMS, Fire, Security Dispatch#: 757-396 3333*** *** Identify exact facility location and position (where possible).** • **Have readily available copy of the Hospital Route Map.** • Determine what are standard facility emergency alarms/signals. • Designate an emergency evacuation route. • Designate an evacuation assembly area. • Know how, what, when injuries/accidents are reported and treated. • Project managers and team leaders to 1) evaluate and ensure worker safety in remote/secluded work areas, 2) confirm if potentially dangerous activities (i.e. coincidence of hunting seasons, live ordinance use, military field exercises/activities, transfer of dangerous cargo/materials etc.) could be occurring in or adjacent to any JV-1 work areas that may jeopardize worker health and safety and 3) reschedule field activities when potentially dangerous activities are not occurring adjacent to JV-1 work locations. Ensure proper two communications with workers in remote work areas. Utilize buddy system.	Level D Modified PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS – SOIL CHARACTERIZATION SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Characterization Sampling (cont.)	Exposure to Constituents of Concern	• Determine if there is a potential of being exposed to hazardous chemicals. If yes, what precautions/training are required? • Follow PPE and action level requirements identified in the site specific HSP. • Perform Hazardous Communication training/awareness. • Pregnant or potentially pregnant JV-1 personnel to consult and be cognizant of shall review and be cognizant of Stand of Practice HSE-120, Reproductive Protection before performing any hazardous or potentially hazardous duty. • Do not use non-explosive proof lighting/equipment, cell phones, lighters or other potential sources of ignition in areas where flammable or combustible gases or liquids are stored or utilized. Do not smoke in chemical/flammable/combustible material storage areas. • Use air monitoring equipment identified in project specific HSP. • Review contaminants of concern for the project and consult project specific HSP for proper dermal and respiratory protection. • Practice “no hand-face” contact at all times. • Always wash hands before eating, drinking, smoking and leaving site. • Skin contact with contaminated water, soils, debris, or equipment shall be avoided at all times. • Caution should be exercised when filling bottles containing acid or base preservatives. Both liquid and vapor phases of acid can cause severe burns. • Following sample collection, sample container lids should be tightened securely to prevent any leaks, and the containers should be rinsed with clean water to ensure that they are free of chemical constituents. Sample activities, sample collection, and equipment decontamination procedures. • The personnel handling acids and the other corrosive materials are required to wear long pants, long-sleeved shirts, and closed-toe shoes (preferably leather). In addition, nitrile gloves and chemical goggles must be worn. All transfers should take place in a properly operational fume hood or a well-ventilated area. In the event of a small spill, the spill area should be thoroughly flushed with water.	Level D Modified PPE Dermal and respiratory protection in accordance with HSP.	Visual Inspection * * Note Utilize air monitoring device identified in Project specific HSP.

ACTIVITY HAZARD ANALYSIS – SOIL CHARACTERIZATION SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Characterization Sampling (cont.)	Other	• Discourage unprofessional and undesirable acts on all JV I project sites. • Remind workers not to respond/participate in unprofessional and undesirable acts started by others. • Personnel to observe drug free work place policy. • Unsafe/undesirable acts to be reported to project management and safety represents for evaluation and/or corrective action. • Employees to represent themselves in a professional manner and appropriate work attire during work hours/on-site.	NA	NA

ACTIVITY HAZARD ANALYSIS – WELL GAUGING, SAMPLING, PRODUCT & IDW MANAGEMENT		
EQUIPMENT REQUIRED	**INSPECTION REQUIREMENTS**	**TRAINING/AWARENESS REQUIREMENTS**
• First Aid Kits • Sample Containers	• Visual Inspections of designated work areas identify and address hazardous conditions.	• Review AHA/PTSP with all task personnel. • Review HSP. • Review operations/safety manuals for all equipment utilized. • Training per 29 CFR 1910.120 or other training as required for SoW tasks. • Behavior Based Loss Prevention Training.

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ACTIVITY HAZARD ANALYSIS FOR MATERIAL EXCAVATION & LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Material Excavation & Loadout	Underground/Over head Utilities, Buried Objects	• Identify all utilities at the site before work commences call Miss Utility In VA for Utility cleanance or secure dig permit from Base official • Cease work immediately if unknown utility markers are uncovered Use manual excavation within 3 feet of known utilities • Utility clearance shall conform with 29 CFR 1926.955 (high voltage >700 kv) 15 feet phase to ground clearance; 31 feet phase to phase clearance • Utilization of "second party" utility verification services were unknown or congestion of underground utilities may exist • Stop all work and notify Client, Regional Manager and HSM in potential MEC/UXO is identified.	Standard Level D PPE * or in accordance w/ the HSP *Hardhats & safety glasses, sturdy, hard toe foot protection (ANSI approved). Hearing and hand protection as required by task. Reflective vests/high visibility clothing in vehicular traffic areas.	Visual Inspection
	Haul Trucks	• Truck operators must be qualified and are responsible for the safe operation of their vehicle. • Operators must wear seat belts and drive at posted speed limits. • Haul trucks must be equipped with back-up alarms or provided with a spotter when backing. • Drivers not to use cell phones while driving on base/site • Convey clear site access and egress directions and site/base facility operation requirements to haul truck drivers. Remove drivers who can not comply with JV-1 program/site or base performance requirements. • Do not over load haul trucks above legal limits. • Avoid potential "flip over radius" of hauling vehicles	Standard Level D PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR MATERIAL EXCAVATION & LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Material Excavation & Loadout (Cont.)	Struck By/ Against Heavy Equipment	• Equipment only to be operated by personnel qualified to do so (by training or experience). • Use traffic control personnel and/or signage to assure safety traffic conditions adjacent to the site. • Keep haul trucks on designated haul routes base roads and site. • Never walk under a suspended load • Wear reflective warning vests or high visibility clothing to promote visibility of ground personnel to equipment operator(s). • Isolate equipment swing areas from ground personnel/ objects. • Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator(s). • Understand and review hand signals. Follow hand signals of ground personnel for equipment manipulation when placing/loading equipment into bucket. Designate one person to signal operators/drivers. • Ensure equipment has operable back-up alarms. • Step away from equipment when adjustments are made. • Ensure heavy equipment operator has spotter for obstructed views and backing up • Avoid positioning personnel between/close to fixed objects and operating equipment. • Immediately notify Project Manager, HSM and Program Manager of all property or equipment damage.	Standard Level D PPE or in accordance w/ the HSP	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR MATERIAL EXCAVATION & LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Material Excavation & Loadout (Cont.)	Haul Trucks	• Truck operators must be qualified and are responsible for the safe operation of their vehicle. • Operators must wear seat belts and drive at posted speed limits. • Haul trucks must be equipped with back-up alarms or provided with a spotter when backing. • Drivers not to use cell phones while driving on base/site • Convey clear site access and egress directions and site/base facility operation requirements to haul truck drivers. Remove drivers who can not comply with JV-1 program/site or base performance requirements. • Do not over load haul trucks above legal limits.	Standard Level D PPE or in accordance w/ the HSP	Visual Inspection
	Slips, Trips, Falls	• Clear walkways and work areas of objects. Institute and maintain good housekeeping practices. • Only walk or climb on surfaces designed for personnel access (including heavy equipment). • Be aware of poor footing and potential slipping and tripping hazards in the work area (wet/steep slopes, holes, ditches, rip rap, utilities). Employees walking in ditches, swales and other drainage structures adjacent to roads, across undeveloped land or or other uneven surfaces must use caution to prevent slips and falls, which could result in twisted or sprained ankles, knees, and backs. • Use sturdy, hard toe foot protection that provides ankle support. Exit equipment slowly and maintain three point contact. Clean boot soles before climbing on equipment. • Park equipment in areas where operator can see clearly to dismount equipment. Watch footing on the side of the embankments/slopes. • Utilization of barricades or open trench warning identification surrounding open excavations during non-work hours or in areas of inactivity. • Immediately notify Project Manager, HSM and Program Manager of all accidents or injuries.	Standard Level D PPE or in accordance w/ the HSP	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR MATERIAL EXCAVATION & LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Material Excavation & Loadout (Cont.)	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Standard level D PPE or in accordance w/ the HSP, Hearing protection	Noise Dosimeter * (* only when determining the removal of hearing protection)
	Equipment failure	• Perform daily maintenance and inspections on operating equipment. Keep documentation on site. • Avoid/take care around pressurized lines/hoses. Inspect hoses daily for cuts, abrasions and wear.	Standard Level D PPE or in accordance w/ the HSP	Visual Inspection
	Manual Lifting	• Material handling equipment only to be operated by qualified personnel (by training or experience). • When performing manual lifting, observe proper lifting techniques (knees not back). • For manual lifting, obey sensible lifting limits (50 lb. Maximum per person manual lifting). Get assistance when lifting greater than 50 lbs. or when handling awkward objects. • Never walk under suspended loads. • Use mechanical lifting equipment to move large, awkward loads. • Avoid carrying heavy objects above shoulder level (manual lifting). • Utilize only tagged/load rated rigging. Rigging only to be utilized by personnel by a person trained or experienced to do so. Store rigging in a vertical position, wherever possible, to promote inspection prior to each use. Maintain inspection log for rigging in/near storage area when rigging is required. • Notify project management/safety representatives of previous injuries which could be aggravated or re-injured by repetitive lifting or motions.	Standard Level D PPE, or in accordance w/ the HSP, puncture resistant gloves	Visual Inspection
	Pinch points	• Review equipment adjustment procedures, identify pinch points • Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles. • Identify and be cognizant of potential pinch points of hand tools.	Standard Level D PPE, or in accordance w/ the HSP puncture resistant gloves	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR MATERIAL EXCAVATION & LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Material Excavation & Loadout (Cont.)	Walking on machine surfaces (heavy equipment)	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces, where possible. • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Maintain 3 point contact when entering or existing machinery • Avoid sudden awkward motions (pulling/jerking fuel hoses). • Observe fall protection standards.	Standard level D PPE	Visual Inspection
	Fire/Explosion Prevention	• Provide ABC (or equivalent) fire extinguisher(s) in the work area (< 50 ft away). • Allow warm or hot engine surface to cool before fueling. Use funnels and nozzles during fueling operation. • Store flammable and combustible materials in approved containers in well ventilated areas. • Only allow storage of flammable and combustible materials in metal safety containers. • Eliminate ignition sources in work area. Where ignition sources are required for work, use only controlled sources (sparkers). • Be cognizant of the location of flammable or combustible materials • Secure facility “hot work” permits. Identify and have available facility fire and EMS dispatch phone numbers.	Standard Level D PPE	Visual Inspection 4 gas Meter
	Visible Lighting	• Perform tasks in daylight hours whenever possible. If dawn, dusk or dark work is to be performed portable lightly must be provided to sufficient illuminate work area(s). • Do not enter poorly lit areas without first providing portable illumination. • Do not use non-explosion proof lighting in areas of flammable or combustible gases or liquids. • Use reflective vests/high visibility clothing in high traffic areas or areas with heavy equipment.	Standard level D PPE, additional lighting as necessary	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR MATERIAL EXCAVATION & LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Material Excavation & Loadout (Cont.)	Biological	• Observe and avoid ground surfaces especially in wet or grassy areas where there is evidence or presence of snakes (poisonous). • Observe ground surfaces or surrounding vegetation or structures for presence fire ants, spiders, bee/wasp hives etc. Check body and clothing for ticks, chiggers, spiders. • Observe areas for presence of stinging insects. Notify supervisors of known allergies to stinging insects and location of antidotes. Use insect repellant. Avoid exposure to blood bourne pathogens	Standard PPE Insect repellant, appropriate work attire (clothes sufficiently covering body).	Visual Inspection
	Low Ambient Temperature	• Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather. • Frequent intake of warm non-caffeinated fluids to maintain body core temperature. • Frequent intake of non- caffeinated liquids to prevent dehydration. • Obtain and review weather forecast— be aware of predicted weather systems. • Observe one (buddy system) another for initial signs of cold-related disorders. • Frequent observance of Wind Chill Chart (HSP section 3.11.12) to assist with work warming regiment determination and frostbite avoidance	Standard PPE w/ following as applicable. hard hat liners/hats, layered clothing w/ polypropylene/cotton (moisture wicking) materials adjacent to skin with thermal over layers, wind/moisture resistant coats/pants gloves.	Meteorological Equipment
	Other	• Discourage unprofessional and undesirable acts on all JV I project sites. • Remind workers not to respond/participate in unprofessional and undesirable acts started by others. • Personnel to observe drug free work place policy. • Unsafe/undesirable acts to be reported to project management and safety represents for evaluation and/or corrective action. • Employees to represent themselves in a professional manner and appropriate work attire during work hours/on-site.	NA	NA

ACTIVITY HAZARD ANALYSIS FOR MATERIAL EXCAVATION & LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Excavator • Haul trucks • First Aid Kits • Communication (two way/cell phones)		• Perform daily equipment inspections as per manufacturers requirements and equipment maintenance • If rigging (wire rope, slings chains with D rings) is used an inspection form must be prepared and maintained. All rigging must be tagged for load ratings. • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers) • Visual Inspections of designated work areas.	• Review AHA/PTSP with all task personnel. • Review HSP. • Review operations/safety manuals for all equipment utilized. • Training per 29 CFR 1910.120 or other training as required for SoW tasks. • Behavior Based Loss Prevention Training.	

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ACTIVITY HAZARD ANALYSIS FOR EXCAVATION BACKFILL				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Backfilling	Struck By/ Against Heavy Equipment	• Wear reflective warning vests or high visibility clothing. • Isolate equipment swing areas • Make/maintain eye contact with operators before approaching equipment. Do not approach equipment from rear or from blind spot of operator • Understand and review hand signals • Ensure equipment has operable back-up alarms • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Use "spotters" during material delivery but avoid potential "flip over radius" of delivery vehicles • Maintain/use PPE	Standard Level D PPE* * Reflective vests/ high visibility clothing, hard hat, safety glasses and ANSI rated work boots/shoes, hearing protection ≥ 85 dbA, hand protection as dictated by task	Visual Inspection
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Hearing protection Standard level D PPE	Noise Dosimeter

	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation and debris
		• Exit equipment slowly and maintain three point contact
		  • Mark, identify, or barricade other obstructions
		  • Identify uneven surfaces or ground protrusions
			Standard Level D PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR EXCAVATION BACKFILL				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Backfilling (continued)	High Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for heat stress in accordance with HSP • Provide proper work break regiments	Light colored cotton clothing when possible, cooling vests with Mod. D or C PPE	Meteorological Equipment
	Low Ambient Temperature	• Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather. • Frequent intake of non-caffeinated fluids to maintain body core temperature. • Frequent intake of non- caffeinated to prevent dehydration. • Obtain and review weather forecast— be aware of predicted weather systems. • Observe one (buddy system) another for initial signs of cold-related disorders. • Frequent observance of Wind Chill Chart (HSP section 3.11.12) to assist with work warming regiment determination and frostbite avoidance	Standard PPE w/ hard hat liners, layered clothing w/ polypropylene/cotton (moisture wicking) materials adjacent to skin with thermal over layers, wind/moisture resistant coats/pants gloves.	Meteorological Equipment
	Overexertion (Manual Excavation)	Use the right tool for the task at hand Avoid actions/activities that produce overexertion Heat stress monitoring • Ensure proper sloping, benching and bracing per EM 385 1-1 section 25 and/or 29CFR1926.650 prior to entry of excavation • Observe confined space entry requirements, monitoring and training prior entrance of an excavation Ensure stable footing and dry work area	Standard Level D PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR EXCAVATION BACKFILL				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Backfilling (continued)	Equipment failure	• Perform daily maintenance inspections on operating equipment • Avoid/take care around pressurized lines/hoses • Competent authorized operators only	Standard Level D PPE	Visual Inspection
	Other	• Discourage unprofessional and undesirable acts on all JV I project sites. • Remind workers not to respond/participate in unprofessional and undesirable acts started by others. • Personnel to observe drug free work place policy. • Unsafe/undesirable acts to be reported to project management and safety represents for evaluation and/or corrective action. • Employees to represent themselves in a professional manner and appropriate work attire during work hours/on-site.	NA	NA
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Hand tools • Small Excavator or backhoe • Compactor • Fire Extinguishers • First Aid Kits		• Daily equipment inspections as per manufacturers requirements • Weekly Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers) • Visual Inspections of designated work areas	• Review AHA/PTSP with all task personnel. • Review HSP. • Review operations/safety manuals for all equipment utilized. • Training per 29 CFR 1910.120 or other training as required for SoW tasks. • Behavior Based Loss Prevention Training.	

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ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Restoration	Struck by/ Against Heavy Equipment	• Wear reflective warning vests or high visibility clothing. • Isolate equipment swing areas • Make/maintain eye contact with operators before approaching equipment. Donot approach equipment from rear or from blind spot of operator • Understand and review hand signals • Ensure equipment has operable back-up alarms • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Maintain/use PPE	Standard Level D PPE* * Reflective vests/ high visibility clothing, hard hat, safety glasses and ANSI rated work boots/shoes, hearing protection ≥ 85 dbA, hand protection as dictated by task	Visual Inspection
	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation and debris • Exit equipment slowly and maintain three point contact • Mark, identify, or barricade other obstructions • Identify uneven surfaces or ground protrusions • Utilization of barricades surrounding open excavations during non-work hours or in areas of inactivity. Barricades shall consist of high visibility 4’ tall temporary construction fencing w/posts or several horizontal rows of caution tape.	Standard Level D PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Restoration (continued)	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Standard level D PPE (w/ hearing protection)	Noise Dosimeter
	Underground/ Overhead Utilities	• Maintain and update all previously secured utility clearances established for each work site. Cease work immediately if unknown utility markers are uncovered. Use manual excavation within 3 feet of known utilities	Standard Level D PPE	GPR or EMR survey tools, public utility clearance
	Handling Heavy Objects	• Observe proper lifting techniques (knees not back) • Obey sensible lifting limits (50 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Avoid manual lifting/carrying tasks • Utilize only tagged, load rated rigging by a competent person	Standard Level D PPE w/ lifting Braces, leather gloves plus	Visual Inspection
	Inhalation of Nuisance Dust	• Review hazardous properties of site contaminants with workers before sampling operations begin • Institute dust control procedures via wetting.	Standard Level D PPE, plus respiratory protection when above action levels.	Aerosol Monitor Visual Inspection
	High Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for heat stress in accordance with HSP • Provide proper work break regiments	Light colored cotton clothing when possible, cooling vests with Mod. D or C PPE	Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Restoration (continued)	Low Ambient Temperature	• Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather. • Frequent intake of non-caffeinated fluids to maintain body core temperature. • Frequent intake of non- caffeinated to prevent dehydration. • Obtain and review weather forecast— be aware of predicted weather systems. • Observe one (buddy system) another for initial signs of cold-related disorders. • Frequent observance of Wind Chill Chart (HSP section 3.11.12) to assist with work warming regiment determination and frostbite avoidance	Standard level D PPE w/ hard hat liners, layered clothing w/ polypropylene/cotton (moisture wicking) materials adjacent to skin with thermal over layers, wind/moisture resistant coats/pants gloves.	Meteorological Equipment
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Avoid razor knives. • Cut away from the body and never towards another worker. • Maintain all hand and power tools in a safe condition	Leather gloves plus Standard Level D PPE	Visual Inspection
	Pinch points	• Review equipment adjustment procedures, identify pinch points • Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles	Standard Level D PPE w/ leather gloves	Visual Inspection

ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Restoration (continued)	Other	• Discourage unprofessional and undesirable acts on all JV I project sites. • Remind workers not to respond/participate in unprofessional and undesirable acts started by others. • Personnel to observe drug free work place policy. • Unsafe/undesirable acts to be reported to project management and safety represents for evaluation and/or corrective action. • Employees to represent themselves in a professional manner and appropriate work attire during work hours/on-site.	NA	NA
EQUIPMENT TO BE USED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Hand tools • Small Excavator or backhoe • Load rated (tagged or labeled) chain w/ D ring or sling capable of carrying suspended loads • Fire Extinguishers • First Aid Kits		• Perform daily equipment inspections as per manufacturers requirements and equipment maintenance • Weekly inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers) • Visual Inspections of designated work areas	• Review AHA/PTSP with all task personnel. • Review HSP. • Review operations/safety manuals for all equipment utilized. • Training per 29 CFR 1910.120 or other training as required for SoW tasks. • Behavior Based Loss Prevention Training.	

	PRINT	SIGNATURE	
Supervisor Name:	_____	_____	**Date/Time:**_____
Safety Officer Name:	_____	_____	**Date/Time:**_____
Site Personnel:	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____

Task Order 059
Site 19 – Removal Action
St. Juliens Creek Annex
Chesapeake, VA

ACTIVITY HAZARD ANALYSIS – LAND SURVEYING / UTILITY RELOCATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Land Surveying/ Utility Location	Slips, Trips, Falls	• Clear walkways work areas of objects • Identify uneven surfaces or ground protrusions • Institute and maintain good housekeeping practices. • Observe/avoid debris in a work area. • Walk or climb only on surfaces designed for personnel access. • Be aware of poor footing and potential slipping and tripping hazards in the work area (wet/steep slopes, holes, ditches, rip rap, utilities).Observe and avoid areas of unprotected holes, ramps and ground penetrations or protrusions (stumps, roots, holes curbs, utility structures etc). Employees walking in ditches, swales and other drainage structures adjacent to roads, across undeveloped land or in controlled industrial work/process areas must use caution to prevent slips and falls, which could result in twisted or sprained ankles, knees, and backs. • If steep/uneven terrain must be negotiated, sturdy hard toe work boots that provide ankle support shall be used. Work boots/shoes shall have shank/toe protection in accordance with ANSI. • Avoid wet or slippery stairs, however if unavoidable, maintain contact with stairway handrail.	Level D Modified PPE * *Hardhats & safety glasses, Sturdy Hard toe work boots, Chemical resistant gloves, boot covers and disposable coveralls	Visual Inspection
	Visible Lighting	• Perform tasks in daylight hours whenever possible. • Do not enter poorly lit areas without first providing portable illumination. • Do not use non-explosion proof lighting/equipment in areas of flammable or combustible gases or liquids. • Use reflective vests/high visibility clothing in high traffic areas or areas with heavy equipment.	Level D Modified PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS – LAND SURVEYING / UTILITY RELOCATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Land Surveying/ Utility Location (Continued)	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Do not use razor knives. • Cut away from the body and never towards another worker. • Maintain all hand and power tools in a safe condition	Level D Modified PPE	Visual Inspection
Land Surveying/ Utility Location (Continued)	High Ambient Temperature	• Provide fluids to prevent worker dehydration. • Monitor for heat stress in accordance with HSP. • Provide proper work break or warming regiments.	Level D Modified PPE Light colored cotton clothing when possible, cooling vests with Mod. D or C PPE	Meteorological Equipment
	Biological	• Observe ground surfaces especially in wet or grassy areas for evidence and presence of snakes (poisonous). • Observe ground surfaces or surrounding vegetation or structures for presence fire ants, spiders, bee/wasp hives rabid animals etc. • Observe areas for presence of stinging insects. **Notify supervisors of known allergies to stinging insects and location of antidotes.** • Use insect repellant. • Avoid exposure to blood bourne pathogens • Check body and clothing for ticks, chiggers, spiders.	Level D Modified PPE Insect repellant, appropriate work attire (clothes sufficiently covering body). w/	Visual Inspection

ACTIVITY HAZARD ANALYSIS – LAND SURVEYING / UTILITY RELOCATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Land Surveying/ Utility Location (Continued)	General Site Control	• Ensure new site workers review and understand HSP requirements. Ensure JV 1 personnel have received the Behavior Based Loss Prevention System (BBLPS) Training. • Determine if there is a potential of being exposed to hazardous chemicals. If yes, what precautions/training are required? • Determine what are the areas of the facility that may not be entered (“restricted areas”). • Determine/know how should an emergency be reported. **SJCA Facility EMS, Fire, Security Dispatch#: 757-396 3333*** **Identify exact facility location and position (where possible).** • **Have readily available copy of the Hospital Route Map.** • Determine what are standard facility emergency alarms/signals. • Designate an emergency evacuation route. • Designate an evacuation assembly area. • Know how, what, when injuries/accidents are reported and treated. • Project managers and team leaders to 1) evaluate and ensure worker safety in remote/secluded work areas, 2) confirm if potentially dangerous activities (i.e. coincidence of hunting seasons, live ordinance use, military field exercises/activities, transfer of dangerous cargo/materials etc.) could be occurring in or adjacent to any JV-1 work areas that may jeopardize worker health and safety and 3) reschedule field activities when potentially dangerous activities are not occurring adjacent to JV-1 work locations. Ensure proper two communications with workers in remote work areas. Utilize buddy system.	Level D Modified PPE	Visual Inspection

ACTIVITY HAZARD ANALYSIS – LAND SURVEYING / UTILITY RELOCATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Land Surveying/ Utility Location (Continued)	Electric Hazards	• For areas were direct exposure to energized electrical equipment may occur, JV-1 shall be accompanied by qualified facility representative. Maintain safe clearance distances between any electrical conducting material (transformers, electric switch gears, sub-panels, motors). Do not access these features. • If/when electrical extension cords are required to complete work, extension cords must be: - Equipped with third-wire grounding. - Covered, elevated, or protected from damage when passing through work areas. - Protected from pinching if routed through doorways. - Not fastened with staples, hung from nails, or suspended with wire. - Extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed. - Rated to handle the voltage/amperage of equipment.	Level D Modified PPE	Visual Inspection
	Other	• Discourage unprofessional and undesirable acts on all JV I project sites. • Remind workers not to respond/participate in unprofessional and undesirable acts started by others. • Personnel to observe drug free work place policy. • Unsafe/undesirable acts to be reported to project management and safety represents for evaluation and/or corrective action. • Employees to represent themselves in a professional manner and appropriate work attire during work hours/on-site.	NA	NA

ACTIVITY HAZARD ANALYSIS – WELL GAUGING, SAMPLING, PRODUCT & IDW MANAGEMENT		
EQUIPMENT REQUIRED	**INSPECTION REQUIREMENTS**	**TRAINING/AWARENESS REQUIREMENTS**
• First Aid Kits • Survey Instruments • GPR or EMR Instruments	• Visual Inspections of designated work areas identify and address hazardous conditions.	• Review AHA/PTSP with all task personnel. • Review HSP. • Review operations/safety manuals for all equipment utilized. • Training per 29 CFR 1910.120 or other training as required for SoW tasks.

	PRINT	SIGNATURE	
Supervisor Name:	_____	_____	**Date/Time:**_____
Safety Officer Name:	_____	_____	**Date/Time:**_____
Site Personnel:	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____

Activity:	**Date:**
	Project:
Description of the work:	**Site Supervisor:**
	Site Health and Safety Officer:
	Review for latest use: **Before the job is performed.**

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	**Potential Health and Safety Hazards** (Analyze each principal step for potential hazards)	**Hazard Controls** (Develop specific controls for each potential hazard)

Equipment to be used (List equipment to be used in the work activity)	**Inspection Requirements** (List inspection requirements for the work activity)	**Training Requirements** (List training requirements including hazard communication)

	PRINT NAME	SIGNATURE	
Supervisor Name:	_____	_____	**Date/Time:**_____
Site Health and Safety Officer:	_____	_____	**Date/Time:**_____
Employee Name(s):	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____

Attachment 11

Pre-Task Safety Plan

AGVIQ ENVIRONMENTAL SERVICES
CH2M HILL JOINT VENTURE

DAILY PRE-TASK SAFETY PLAN (PTSP)

Project: _____ Location: _____ Date:_____

Health and Safety Officer _____ Job Activity: _____

Task Personnel:

_____
_____
_____
_____
_____

List Tasks:

_____
_____

Tools/Equipment/Materials required (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools, cords, generators, compressed gases, regulated chemical products, etc.):

_____
_____
_____

Potential H&S Hazards, including chemical, physical, safety, biological and environmental (Check all that apply):

__ Chemical burns/contact	__ Trench, excavations, cave-ins	__Ergonomics
__ Pressurized lines/equipment	__ Overexertion	__ Chemical splash
__ Thermal burns	__ Pinch points	__ Poisonous plants/insects
__ Electrical	__ Cuts/abrasions	___Eye hazards/flying projectile
__ Weather conditions	__ Spills	__ Inhalation hazard
__Heights/fall> 6’	__ Overhead Electrical hazards	__ Heat/cold stress
__ Noise	__ Elevated loads	__ Water/drowning hazard
__ Explosion/fire	__ Slips, trip and falls	__ Heavy equipment
__Radiation	__ Manual lifting	__ Aerial lifts/platforms
__ Confined space entry	__Welding/cutting	__ Demolition

Continue on page 3 of 3 (if necessary)

Hazard Control Measures (Check all that apply):

PPE	Protective Systems	Fire Protection	Electrical
__ Thermal/lined	__ Locate buried utilities	__ Fire extinguishers	__ Lockout/tagout
__ Eye	__ Competent person	__ Fire watch	__ Grounded
__ Dermal/hand	__ Daily inspections	__ Non-spark tools	__ Panels covered
__ Hearing	__ Sloping	__ Grounding/bonding	__ GFCI/extension cords
__ Respiratory	__ Shoring	__ Intrinsically safe equipment	__ Power tools/cord inspected
__ Reflective vests	__ Trench box	__Combustible materials storage	__Insulated tools/gloves
__ Flotation device	__ Barricades	__Chemical Storage	
Fall Protection	**Air Monitoring**	**Proper Equipment**	**Welding & Cutting**
__ Harness/lanyards	__ PID/FID	__ Aerial lift/ladders/scaffolds	__ Cylinders secured/capped
__ Adequate anchorage	__ Detector tubes	__ Forklift/ Heavy equipment	__ Cylinders separated/upright
__ Guardrail system	__ Radiation	__ Backup alarms	__ Flash-back arrestors
__ Covered opening	__ Personnel sampling	__ Hand/power tools	__ No cylinders in CSE
__ Fixed barricades	__ LEL/O2	__ Crane w/current inspection	__ Flame retardant clothing
__ Warning system	__ Other	__ Proper rigging	__ Appropriate goggles
		__ Operator qualified	
Confined Space Entry	**Medical/Emerg. Response**	**Heat/Cold Stress**	**Vehicle/Traffic**
__ Isolation	__ First-aid & BBP kit	__ Work/rest regime	__ Traffic Awareness
__ Air monitoring	__ Eye wash	__ Rest area	__Traffic control
__ Trained personnel	__ FA-CPR training	__ Liquids available	__ Barricades
__ Permit completed	__ Route to hospital	__ Monitoring	__ Flags
__ Rescue provisions		__ Training	__ Signs
Permits	**Demolition**	**Inspections**	**Training**
__ Hot work	__ Pre-demolition survey	__ Ladders/aerial lifts	__ Hazwaste
__ Confined space	__ Structure condition	__ Lanyards/harness	__ Construction
__ Lockout/tagout	__ Isolate area/utilities	__ Scaffolds	__Equipment
__ Excavation	__ Competent person	__ Heavy equipment	__ Competent person
__ Demolition	__ Hazmat present	__Cranes and rigging	__ Task-specific (AHA)
__ Energized work		__Other per Field Safety Plan	__ Hazcom
__Local/Environmental			

FieldNotes:

_____

_____

_____

_____

_____

_____

Additional Space for Project Specific Hazard Awareness (if necessary):

Attendees:

Name Printed:	Signature:

Meeting Conducted By:

Name Printed Signature

Attachment 12

Safe Worker Observation (SWO) Form

Safe Work Observation Form		
Project:	Observer:	Date:
Position/Title of worker observed:	Background Information/ comments:	
Task/Observation Observed:		

- Identify and reinforce safe work practices/behaviors
- Identify and improve on at-risk practices/acts
- Identify and improve on practices, conditions, controls, and compliance that eliminate or reduce hazards
- Proactive PM support facilitates eliminating/reducing hazards (do you have what you need?)
- Positive, corrective, cooperative, collaborative feedback/recommendations

Actions & Behaviors	Safe	At-Risk	Observations/Comments
Current & accurate Pre-Task Planning/Briefing (Project safety plan, STAC, AHA, PTSP, tailgate briefing, etc., as needed)			**Positive Observations/Safe Work Practices:**
Properly trained/qualified/experienced			
Tools/equipment available and adequate			
Proper use of tools			**Questionable Activity/Unsafe Condition Observed:**
Barricades/work zone control			
Housekeeping			
Communication			
Work Approach/Habits			
Attitude			
Focus/attentiveness			**Observer's Corrective Actions/Comments:**
Pace			
Uncomfortable/unsafe position			
Inconvenient/unsafe location			
Position/Line of fire			
Apparel (hair, loose clothing, jewelry)			
Repetitive motion			**Observed Worker's Corrective Actions/Comments:**
Other…			

Attachment 13

Loss/Near Loss Incident Report Form

Root Cause Investigation

This attachment is provided to assist in accessing, completing, and reviewing an incident investigation. It is important to remember the following when conducting an investigation:

Gather relevant facts, focusing on fact-finding, not fault-finding.
Draw conclusions, pitting facts together into a probable scenario.
Determine incident root cause(s), the basic causes why an unsafe act/condition existed.
Develop and implement solutions, matching all identified root causes with solutions.

Documentation
The following should be included in the IRF to document the incident.

Description

Provide a description of the event and the sequence of events and actions that took place prior to the incident. Start with the incident event and work backwards in time through all of the preceding events that directly contributed to the incident. The information should identify why the event took place as well as who was involved, when and where the event took place, and what actions were taken.

Cause Analysis

Using the form and flowchart in this attachment the root cause of the incident will be determined. This form must be retained in the project and/or regional HS&E files.

Immediate Causes—List the substandard actions or conditions that directly affected the incident. The following are examples of immediate causes:

> ***Substandard Actions*:** Operating equipment without authority; failure to warn; failure to secure; operating at improper speed; making safety device inoperable; using defective equipment; failing to use PPE; improper loading; improper lifting; improper position for task; under influence of alcohol or drugs; horseplay.
>
> ***Substandard Conditions:*** Exposure to hazardous materials; exposure to extreme temperatures; improper lighting; improper ventilation; congestion; exposure to fire and explosive hazard; defective tools, equipment or materials; exposure to extreme noise; poor ventilation; poor visibility; poor housekeeping.

Basic Causes—List the personal and job factors that caused the incident. The following are examples of basic causes:

> ***Personal Factors:*** Capability; knowledge; skill; stress; motivation.
>
> ***Job Factors:*** Abuse or misuse; engineering; maintenance; purchasing; supervision; tools and equipment; wear and tear; work standards.

Corrective Action Plan

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a time frame for completion. Be sure the corrective actions address the causes. For example, training may prevent recurrence of an incident caused by a lack of knowledge, but it may not help an incident caused by improper motivation.

The following are examples of management programs that may be used to control future incidents. These programs should be considered when determining specific corrective actions.

Management Programs: Accident/incident analysis; emergency preparedness; engineering controls; general promotion; group meetings; health control; hiring and placement; leadership and administration; management training; organizational rules; personal protective equipment; planned inspections; program audits; program controls; purchasing controls; task analysis and procedures; task observation.

Incident & Near-Loss Investigation Report Form

Employer Information

Company Name: _____

Project Name: _____ Task Order: _____

Project Location: _____

Task Location: _____

Job Assignment: _____

Preparer's Name: _____ Preparer's Employee Number: _____

Incident Specific Information

Date of Incident: _____ Time of Incident: _____ a.m./p.m.

Location of incident:
☐ Company premises
☐ Field
☐ In Transit
☐ Other: _____
_____

Address where the incident occurred: _____

Equipment Malfunction : Yes ☐ No ☐ Activity was a Routine Task: Yes ☐ No ☐

Describe any property damage: _____

Specific activity the employee was engaged in when the incident occurred:
_____
_____

All equipment, materials, or chemicals the employee was using when the incident occurred:
_____
_____

Describe the specific incident and how it occurred:
_____
_____
_____
_____
_____

Describe how this incident may have been prevented:

_____
_____
_____
_____

Contributing Factors (Describe in detail why incident occurred):

_____
_____
_____
_____

Date employer notified of incident: _____ To whom reported: _____

Witness Information (First Witness)

Name: _____
Employee Number_____
Address:_____
City: _____
Zip Code : _____
Phone: _____

Witness Information (Second Witness)

Name: _____
Employee Number_____
Address:_____
City: _____
Zip Code : _____
Phone: _____

Additional information or
comments:_____
_____
_____

A ROOT CAUSE ANALYSIS FORM MUST BE COMPLETED FOR ALL INJURIES AND ILLNESSES OR ACTUAL LOSSES.

COMPLETION OF THE ROOT CAUSE ANALYSIS FORM FOR NEAR LOSSES IS OPTIONAL, AT THE DISCRETION OF THE HEALTH AND SAFETY MAANGER.

Determination of Root Cause(s)

For minor losses or near losses the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, to determine the root cause, and to develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must use the Root Cause Analysis Flow Chart to assist in identifying the root cause(s) of a loss. Any loss may have one or more "root causes" and "contributing factors". The "root cause" is the primary or immediate cause of the incident, while a "contributing factor" is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the *person* involved in the loss, his or her peers, or the supervisor should be referred to as "personal factors". Causes that pertain to the *system* within which the loss or injury occurred should be referred to as "job factors".

<u>Personal Factors</u>

1. Lack of skill of knowledge
2. Correct way takes more time and/or requires more effort
3. Short-cutting standard procedures is positively reinforced or tolerated
4. Person thinks that there is no personal benefit to always doing the job according to standards

<u>Job Factors</u>

1. Lack of or inadequate operational procedures or work standards.
2. Inadequate communication of expectations regarding procedures or standards
3. Inadequate tools or equipment

The root cause(s) could be any one or a combination of these seven possibilities or some other "uncontrollable factor". In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates "all" seven other factors.

Incident & Near-Loss
Root Cause Analysis Form

Root Cause Analysis (RCA)

Root Cause Categories (RCC): Select the RCC numbered below that applies for the root cause (RC) and/or contributing factor (CF) in the first column, then describe the specific root cause and corrective actions in each column.

77. Lack of skill or knowledge
78. Absence of, inadequate, or lack of current operational procedures or work standards
79. Inadequate communication of expectations regarding procedures or work standards
80. Absence of or inadequate tools or equipment
81. Correct way takes more time and/or requires more effort
82. Short cutting standard procedures and safe practices is positively reinforced or tolerated
- **Person thinks there is no personal benefit to always doing the job according to standards**

RCC #	Root Cause(s)	Corrective Actions	RC[1]	CF[2]	Due Date	Completion Date	Date Verified

[1] RC = Root Cause; [2] CF = Contributing Factors (check which applies)

Investigation Team Members

Name	Job Title	Date

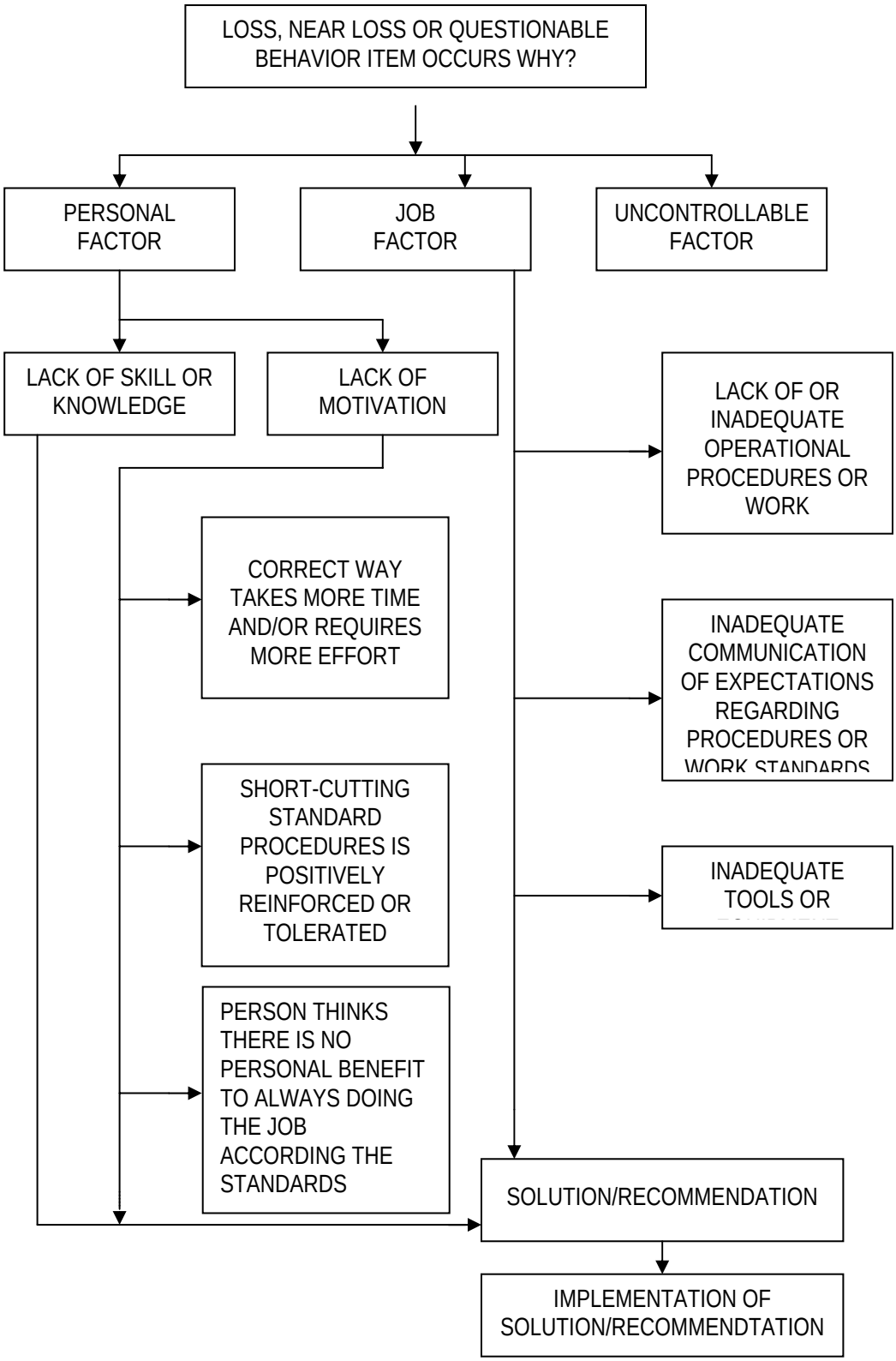
Results of Solution Verification and Validation

Reviewed By

Name	Job Title	Date

Root Cause Analysis

Flow Chart



Attachment 14

Emergency Contact List

Emergency Contact List

24-hour CH2M HILL Emergency Beeper – 888/444-1226

Medical Emergency *

Fire Emergency *

Security Emergency*

* See site Specific Hospital Route Maps for emergency contact information. **Off Base Emergencies can be handled by dialing 911.**

CH2M HILL- Medical Consultant
Dr. Jerry H. Berke, M.D., M.P.H.
Health Resources
600 West Cummings Park, Suite 3400
Woburn, MA 01801-6350
781/938-4653
800/350-4511
(After hours calls will be returned within 20 minutes)

AGVIQ Medical Consultant(s)

Refer to AQVIQ VBO office for a detailed list of Medical Facilities/contacts.

JV I Program Manager
Name: Dave Leadenham AGVIQ
Phone: 757-318-9420 x19/ 757- 544- 6858 (cell)

JV I Deputy Program Manager/ Project Manager
Name: Lee Kellam – CH2MHill
Phone:757-873-1442 x23 / 757-291-1284 (cell)

AGVIQ Corporate Human Resources Department
Name: Kristy Payne
TIKIGAQ Corp. Anchorage, AK
Phone: (907) 365 6242

CH2MHILL Corporate Human Resources Department
Name: Pete Hannon, DEN
Phone: 303-771-0900

Utilities Emergency
Water: 757-382-3550
Gas: 877-572-3342
Electric: 888-667-3000

JV I HSM
Name: Richard Rathnow – CH2MHill
Phone: (865) 483 9005 (572)
Cell: (865) 607 6734

JV I Health & Safety Officer (HSO)
Name: Glen Jackson
Cell Phone: (757) 644 8293
Office Phone: (757) 318 9420 x12

AGVIQ Worker's Compensation and Auto Claims

Name Cherry Perley
TIKIGAQ Corp. Anchorage, AK
Phone: (907) 365 6242
AGVIQ personnel to report all accidents or injuries to AGVIQ HSM or HSO immediately but no later than 24 hrs. Fatalities and hospitalizations shall require immediate notification.

CH2MHill Worker's Compensation and Auto Claims

Sterling Administration Services
Phone: 800/420-8926 After hours: 800/497-4566

Report fatalities AND report vehicular accidents involving pedestrians, motorcycles, or more than two cars.

AGVIQ HSM
Name: Troy Izatt
Office phone # (907) 365-6182
Cell phone # (907) 748-3697

Federal Express Dangerous Goods Shipping
Phone: 800/238-5355
Emergency Number for Shipping Dangerous Goods
Phone: 800/255-3924

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms:
Site Specific

Evacuation Assembly Area(s):
Facility Pass and ID Security Lot

Facility/Site Evacuation Route(s): Developed site specific on-site prior to start of work

---

Hospital Name/Address: See site Specific Hospital Route Maps for emergency contact information.

Attachment 15

Site Specific Accident Prevention Plan

Accident Prevention Plan

Site 19 - Removal Action

St. Juliens Creek Annex
Chesapeake, VA

Contract No: N62470-03-D-4401
Contract Task Order 059

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division

Prepared by:

AGVIQ ENVIRONMENTAL SERVICES
CH2M HILL
JOINT VENTURE

January 2006

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Acronyms and Abbreviations

ANSI	American National Standards Institute
APP	Accident Prevention Plan
ASTM	American Society for testing and Materials
CFR	Code of Federal Regulation
CIH	Certified Industrial Hygienist
CPR	cardiopulmonary resuscitation
EMT	emergency medical technician
OM	Corporate Operations Manager
EH&S	Environmental Health and Safety
HSO	Health and Safety Officer
HSP	Health and Safety Plan
JVI	AGVIQ-CH2M HILL Joint Venture
NIOSH	National Institute for Occupational Health
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
ROICC	Resident Officer in Charge of Construction
TBD	to be determined

1.0 Signature Sheets

Plan Acknowledged By:

Name:	David R. Leadenham, Program Manager
Title:	Program Manager
Company:	AGVIQ/CH2M HILL Joint Venture (JV I)
Telephone:	757-318-9420 x19
Fax:	757-318-9421

hereby acknowledge that I have reviewed and fully understand the tenets of this Accident Prevention Plan and my responsibilities as they are specified herein.

Signature: _____

David R. Leadenham, Program Manager

Designated Project Manager:

Name:	Lee Kellam
Title:	Project Manager
Company:	AGVIQ/CH2M HILL Joint Venture
Telephone:	757-873-1442 x 23
Fax:	757-873-7657

I hereby acknowledge that I have reviewed and fully understand the tenets of this Accident Prevention Plan and my responsibilities as they are specified herein.

Signature: _____

Craig Miller, Project Manger

Designated Site Safety Officer:

Name:	Glen Jackson
Title:	Health and Safety Officer
Company:	AGVIQ/CH2M HILL Joint Venture
Telephone:	757-318-9420 x12
Fax:	757-318-9421

This Accident Prevention Plan was prepared in part by:

Signature: _____

Glen Jackson, Health and Safety Officer

2.0 Background Information

Background information for this project is detailed in the Health and Safety Plan (HSP), Section 1.0 through 1.5.

3.0 Statement of Safety and Health Policy

3.1 Objective

To provide a Safe Work Place for all employees by developing and administering an overall Environmental Health and Safety (EH&S) Program. To establish written policies and procedures that serve as vehicles through which the program will be implemented.

3.2 Purpose

This statement describes the AGVIQ/CH2M HILL Joint Venture I (JV I) Health and Safety Program and the responsibilities of the supervisors, employees, and subcontractors. It will address applicable United States Occupational Safety and Health Administration (OSHA) standards set forth in 29 CFR 1910 and 29 CFR 1926 as well as various consensus standards and JV I policies by the use of referenced procedures.

3.3 Primary Environmental Health and Safety Program Functions

The primary functions of the Environmental Health and Safety program are to:

- Define the health and safety responsibilities of JV I personnel.
- Administer the medical surveillance program.
- Prepare the site safety plans.
- Provide safety training/maintaining training records.
- Provide safety procedures and protocols to be used at project sites, shops, and offices.
- Conduct accident investigations and maintaining records.
- Verify OSHA compliance under 29 CFR 1910 and 1926.
- Provide guidance and assistance with preparation of safety protocols for specific tasks.
- Promote safety and health consciousness within the company.
- Designate the functional organization of safety committees to serve corporate and project specific safety and health program needs.

3.4 Safety Organization and Responsibility

With JV I, the safety and protection of employees, clients, and the community is the first priority. This concern for safety is not restricted to field operations but extends to

laboratories, the offices, and shop facilities. If an activity or condition is unsafe, the task will not proceed until the situation is corrected.

The **Company President** is the primary operational safety official in the company.

The **Corporate Operations Manager** (COM) administers the safety program for JV I and reports directly to the company president. The COM, or his designee, is responsible to support and assist site supervisors in executing the EH&S Program.

The **Health and Safety Officer** (HSO) is responsible for administration and enforcement of the safety procedures and protocols on project sites. The HSO is the primary safety official at the working level. The responsibility for safety is delegated and shared by project managers, alternate site safety officers, and subcontractors' supervisors. At a minimum, the HSO must perform, or otherwise supervise the performance of, the following:

- Motivate employees and supervisors of subcontractors to adhere to JV I's safety policy in each work situation.
- Schedule, organize, and lead preparatory phase meetings prior to all activities relevant to definable features of work and have a working knowledge of the safe procedure for all jobs and tasks under their supervision. When in doubt, seek assistance prior to initiating a task. This is the only acceptable manner in which to perform the task. If the task cannot be accomplished safely, it will not be attempted.
- Explain the safety procedure involved with a task to each employee and check frequently to see that the employee understands and works as instructed.
- Allocate sufficient time for the training and coaching of all employees to insure that everyone knows the correct procedure for safely accomplishing required tasks. New employees will not be allowed to perform any work until required training is completed.
- Immediately correct unsafe conditions that involve JV I employees or subcontractors.
- Ensure that employees are outfitted with and wear personal protective equipment as specified by this plan, EM385-1-1, and other JV I procedures.
- Set a good safety example.
- Obtain the cooperation of employees and sub-contractors. Sub-contractor safety performance records will be verified prior to contract award and will be continually monitored during operations.
- Report all accidents, near misses and property damage in accordance with the Incident Management and Reporting Procedure.

Every Employee, regardless of job title, shares the responsibility for safety and should report any unsafe work condition without fear of reprisal. It is imperative that employees observe the following minimum requirements in order to achieve a safe and healthy workplace:

- Each employee must be familiar with this Accident Prevention Plan and the general safety rules herein.

- Each employee will practice safe procedures and follow all safety rules and regulations for the successful completion of any job task.
- All employees will wear the necessary personal protective equipment required for the job or task as specified by this plan, EM385-1-1, and other JV I procedures.
- The employee will notify the immediate supervisor of any potential hazard or unsafe work practice that could result in injury or destruction of property.
- The employee will report all accidents to an immediate supervisor regardless of whether injury or property damage resulted. This includes all near misses (accidents without injury or damage). This requirement serves to bring unsafe conditions to the attention of management.
- Each employee will be subject to contraband search for safety purposes and for the safety of fellow employees.
- Violations of published safety policies and procedures may be cause for disciplinary actions up to and including dismissal.
- All employees who are taking prescribed medications that could affect work performance or might alter the manner in which they could be treated in an emergency will so advise their supervisor prior to beginning work.

3.5 Regulator Compliance Policy

The policy of JV I will be to comply with all federal, state, local, and client regulations. It is the responsibility of all personnel to perform all work in full compliance with appropriate regulations. Safety and health personnel will immediately bring any condition regarding safety and health compliance to the attention of supervisory operating personnel.

JV I will ensure regulatory compliance by all of its subcontractors, including OSHA 200 forms, safety records, OSHA training, and medical surveillance, when applicable.

3.6 Safety Goals

The goal of the safety and health program is to ensure a safe working environment, protect workers from harm, and protect the company from liability associated with an unsafe working environment.

Other goals are to eliminate workplace accidents, gain worker acceptance through cooperation and training, and provide our clients with a responsible, well-trained, safety-oriented work force.

JV I has adopted a “zero accidents” goal for all operations. All activities will be planned and performed with this goal foremost.

3.7 Safety Training

JV I engages in environmental remediation, construction, and other services, and must comply with numerous health and safety training requirements, mandated by governmental agencies, clients, and internal policies.

All personnel will be provided sufficient training to execute their jobs in a safe and healthy manner.

Direct supervisors are responsible to determine the training requirements of a task and ensure employees have the necessary training to complete the task safely. EH&S personnel will assist with this determination and training.

The corporate personnel department will maintain training records and documentation.

3.8 Medical Surveillance

All employees who perform work at hazardous waste sites or perform emergency response will be subject to the JV I medical surveillance program. This program conforms to the requirements established by 29 CFR 1910.120/1926.65 (f) Medical surveillance and is titled EH&S Procedure 3-1, Occupational Health Examination Program.

3.9 Accident Investigation

All accidents will be thoroughly investigated by the supervisor of the person(s) involved in the accident. The employee and the site supervisor will forward a signed copy of the accident investigation form to the corporate health and safety office to comply with JV I requirements.

The COM may investigate serious accidents, such as those involving hospitalization or injuries requiring more than one visit to a physician. The COM may also request that a specific written accident investigation be conducted in case of an unusual or serious injury or accident.

3.10 Position Statement on Modified Work

JV I will attempt to eliminate all accidents through strict compliance with OSHA regulations and JV I health and safety procedures, as well as supervisor and employee safety training, safety audits, and constant attention to safety. Should employee be injured or become ill in the course of and arising from his employment, JV I will attempt to provide modified work. Modified work (light duty) will be made available in order to bring the injured employee back to the work environment, for the benefit of the employee and the company, whenever medically appropriate.

Employees are expected to return to modified work when medically capable. The work assigned to the injured employee will meet the restrictions set forth by the treating and/or company physician. Examples of modified work include but are not limited to office work, dispatching, and light shop work.

3.11 Field Safety Inspections

Weekly safety inspections will be made of the work area. The inspection will be made by the Project Manager and/or the HSO, or a designated representative. These inspections are in addition to the daily inspections to be held by the HSO and crew leaders. Discrepancies found during inspections will be corrected as soon as practicable. Serious safety violations will be corrected immediately. Inspection records will be maintained in the safety log.

Additionally, the COM or his designated representative may make periodic unannounced inspections of work sites on their own discretion or at the request of an employee, supervisor, manager, or client.

3.12 First Aid

Each facility and work location must be evaluated to determine the potential requirement for medical emergencies. At a minimum, an industrial first-aid kit will be provided. An adequate number of employees with current certification in first aid and cardiopulmonary resuscitation (CPR) will be maintained on the project sites.

The HSO will ensure that emergency medical attention is readily available. For emergency response and remediation operations, the HSO will establish the requirement for medical emergency response and identify an emergency medical facility with chemical contamination trauma capability. If site conditions require, a subcontract emergency medical technician (EMT) and/or the availability of ambulance service on site will be implemented.

3.13 Review of Health and Safety Statistics

A designated representative from JV I will review and tabulate safety statistics as necessary:

- OSHA 200 form
- Workers' Compensation Experience Modification Ratings

3.14 Specific Written Safety Procedures/Permits

In order to provide a safe work place and communicate specific work requirements for regulatory compliance, specific tasks are incorporated by reference to this procedure. These procedures deal with specific areas such as confined space, hot work, lock out tag out, etc.

All JV I personnel who may be subject to these procedures will receive appropriate training and will be held accountable for compliance with procedure requirements.

3.15 State, OSHA, and Other Regulations

Where state regulations differ from federal regulation cited in this plan, the more stringent regulation will apply.

3.16 Changes

Any user of this plan is welcome to recommend changes. Changes normally result from finding errors, regulatory changes, equipment modification, new equipment purchases, and changes to operation procedures or site conditions. The format for making a recommended change is:

Submit a written recommendation to the COM via your immediate supervisor. The COM will review the recommendation.

After review, the COM will determine if the suggestions should be included as an amendment or new procedure in this plan. Changes to this plan will be distributed immediately upon approval.

4.0 Responsibilities and Lines of Authorities

The following listed JV I personnel will have the authority to intervene and suspend work in the interest of safety policy compliance:

- Dave Leadenham — Program Manager
- Lee J. Kellam — Deputy Program Manager
- Craig Miller — Senior Technical Manager
- Richard Rathnow — Health & Safety Manager
- Glen Jackson — Site Health and Safety Officer

Safety responsibilities, accountability and lines of authority are further discussed in Section 2.1 of the HSP, Project Safety Responsibilities.

5.0 Subcontractors and Suppliers

5.1 Subcontractor/Supplier Coordination and Control

JV I subcontractors will be screened for safety performance and compliance with federal alcohol and drug testing requirements prior to being issued any contract for site work. JV I subcontractors will comply with the requirements for site safety as outlined in JV I health and Safety Procedures.

5.2 Subcontractor/Supplier Safety Responsibilities

All subcontractor employees are subject to the same training and medical surveillance requirements as JV I personnel depending on job activity. All activities involving the potential for exposure to hazardous waste materials will require medical and training certification as mandated by 29 CFR 1910.120. All subcontractor personnel will be required to sign in daily and be required to attend a daily meeting discussing operations and safety issues. All subcontractors involved in construction/remedial activities will complete a Subcontractor Pre-Job Safety Checklist prior to the start of work at the site. Subcontractors will submit Activity Analyses for their work activities to the JV I HSO. The subcontractor reports directly to the JV I Project Manager. All incidents involving subcontractor employees will be reported to the JV I Site Safety Officer and a copy of the subcontractor's injury/illness report will be submitted to the JV I HSO within 24 hours.

JV I subcontractors are required to sign off and comply with all requirements of the JV I Site-Specific Health and Safety Plan, which includes this Accident Prevention Plan (APP), Hurricane Preparedness Plan. Plans to address specific hazards may be added to the APP by during the course of work. JV I subcontractors will be required to sign off and comply with any such supplemental plans. Contractors not in compliance will be immediately dismissed from the site.

Suppliers delivering various materials to the project site or providing equipment and equipment maintenance will comply with all rules and regulations specified by the owner. Supplier personnel will not be permitted into contaminated areas unless training and medical surveillance is in accordance with 29 CFR 1910.120. Contractors will not ride on tractors, forklifts or similar vehicles unless specific seats are provided. They will follow Facility hot work rules if hot work is required for vehicle or equipment maintenance. Trucks will be loaded and unloaded in a safe and effective manner and materials will be stored safely in designated locations only. Associated packaging will be properly disposed of and litter will not be permitted to be scattered or blown from truck beds. Operators of mobile equipment on site must observe all traffic rules such as speed limits and right-of-ways of pedestrians.

6.0 Training

6.1 Safety Indoctrination Subjects

Outlines of the site safety orientation for JV I and subcontractor personnel and visitors are provided in Section 9.0 of the HSP, Training Requirements.

6.2 Mandatory Training and Certifications

Mandatory training and certifications are discussed in Section9.0 of the HSP, Training Requirements.

All personnel entering an exclusion zone will be trained in the provisions of this Accident Prevention Plan and be required to sign the Accident Prevention Plan. Site-specific training for the assigned Task Orders are included in Section 9.0 of the HSP, Training Requirements.

6.3 Supervisory and Employee Safety Meetings

The JV I HSO or authorized designate will conduct daily safety meetings 'at the start of each work shift for on site personnel and will require subcontractors to follow similar meeting procedures or participate in the JV I daily safety meetings.

7.0 Safety and Health Inspections

The JV I Project Manager and HSO are required to perform site safety inspections using the Site Safety Inspection Checklist. The HSO is responsible for conducting and preparing reports of daily safety inspections of work processes, site conditions, equipment conditions and submitting them for the project record. The HSO will discuss any necessary corrective actions with the Project Manager and review new procedures. Copies of these reports are maintained on file at the project locations. Additionally, copies will be forwarded to the program COM.

The JV I Safety Manager or his designated representative will periodically conduct site visits and perform Site Safety Assessments. These reports are kept on file and are tracked in a database for each -Project Manager and Supervisor/ Superintendent, including the number of action items noted during the visit and written confirmation of the corrective actions for each item. These responses are compiled and provided to program management for review.

JV I does not anticipate, but may consider the use of, outside sources to provide safety inspections on an as-necessary basis.

As required, JV I safety equipment will comply with appropriate OSHA, National Institute for Occupational Safety and Health (NIOSH), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), and U.S. Coast Guard or other recognized certification organizations.

8.0 Safety and Health Expectations, Incentive Programs, and Compliance

8.1 Company Safety Program Goals

JV I considers safety the highest priority during work at all project sites and it's business offices and has established a goal of **zero incidents.** All projects will be conducted in a manner which minimizes the probability of near misses, equipment/property damage or injury. JV I will establish programs to recognize people and projects that demonstrate excellence in safety performance. JV I will use safety observation programs to identify and correct unsafe acts and conditions. Safety awareness programs will be used to provide continuous training and development of good safety practices. JV I site supervision will investigate all incidents to determine root causes and institute corrective actions to prevent recurrence. JV I will provide and enforce safety rules to protect employees, subcontractors, clients and the public. Project managers and superintendents that demonstrate superior safety performance will be rewarded.

8.2 JV I Employee Safety Responsibility Requirements

Each employee is responsible for personal safety as well as the safety of others in the area and is expected to participate fully in the ***Safety Improvement Process,*** particularly the Safety Observation Program. The employee use all equipment provided in a safe and responsible manner as directed by the HSO. All JV I personnel will follow the policies set forth in the JV I Health and Safety Plan. Site personnel concerned with any aspect of health and safety will bring it to the attention of the Project Manager or HSO. All project personnel have the authority to stop work if it is their judgment serious injury could result from continued activity. The HSO will be notified immediately if this becomes necessary. To protect the health and safety of all personnel, employees that knowingly disregard safety policies/procedures may be subject to disciplinary actions up to and including termination.

8.3 Managers and Supervisors Safety Accountability

It is the duty of the first line supervisor to motivate employees to adhere to JV I's safety policy in each work situation. A first line supervisor for these purposes is defined as that person designated to give immediate onsite supervision to personnel involved in a task.

All supervisors will have complete knowledge of the safe procedure for all jobs and tasks under their supervision. When in doubt, they will seek assistance prior to initiating a task. This is the only acceptable manner in which to perform the task. If the task cannot be accomplished safely, it will not be attempted.

Supervisors will:

- Explain the safety procedure involved with a task to each employee and check frequently to see that the employee understands and works as instructed.
- Allocate sufficient time for the training and coaching of all employees to ensure that everyone knows the correct procedure for safely accomplishing required tasks.
- Prevent new employees from performing any tasks until required training is completed.
- Immediately correct unsafe conditions, which involved JV I employees or contractors.
- Ensure that the employees are outfitted with and wear personal protective equipment as specified by this APP, site-specific health and safety plan, other JV I procedures or as directed by the COM, Project Manager, HSO, or CIH.
- Set a good safety example.
- Obtain the cooperation of employees and contractors.
- Provide a safe work environment for employees and contractors.
- Confirm contractor safety performance records have been verified prior to contract award and monitor contractor performance during operations.
- Report all accidents, near misses and property damage in accordance with the Incident Management and Reporting Procedure.
- Establish a safety culture, using the elements of the JV I Safety Improvement process, which promotes awareness, encourages participation and recognizes excellence.

9.0 Accident Reporting

9.1 Exposure Data (Man-hours Worked)

The JV I COM with assistance from the JV I designated responsible partner tracks and maintains incident records as to Federal reporting requirements (OSHA 200 Log). Incident Rates and Workers Compensation losses are tracked for each Project, Project Manager and Site Supervisor.

9.2 Accident Investigations, Reports, and Logs

The Site Safety Office conducts accident/incident investigations. A report is completed by the HSO and is required to be reviewed and signed by the Project Manager. The report must be submitted to the COM within 24 hours.

9.3 Immediate Notification of Major Incidents

JV I will immediately notify the Resident Officer in Charge of Construction (ROICC) of any major incident, including injury, fire, equipment/ property damage and environmental incident. A full report will be provided within 48 hours. Procedures to be followed in response to any major personal injury are detailed in the Site Specific Health and Safety Plan, Section 10.3, Response.

10.0 Medical Support

On-site Medical Support/Off-site Medical Arrangements are provided in Section 10.0 of the HSP. Emergency phone numbers are listed in Attachment 4 of the HSP.

11.0 Personal Protective Equipment

Hazard Assessment Procedures/Written Certifications for Personal Protective Equipment Protection levels provided in the HSP have been established for the anticipated scope of work once on-site, results of air monitoring and visual inspection of the work activities may indicate the need for changes in these PPE level(s). Any significant change in the PPE level will be approved by the HSO in consultation with the Project Manager, CIH and/or COM. Personal Protective Equipment (PPE) selection criteria are outlined in the HSP, Section 5.0, Protective Equipment.

All personnel using respiratory protection will be cleared by a physician for use of a respirator and will be fit-tested to ensure they can achieve an acceptable fit.

12.0 Plans Required by the Safety Manual

12.1 Hazard Communication Program

The Site-Specific Hazard Communication Program is included Attachment 2 of the HSP. JV I Hazard Communication Program complies with 29 CFR 1926.59/1910.1200.

12.2 Emergency Response Plans

The Site-Specific Emergency Response and Contingency Plan is included in Section 10.0 of the HSP.

12.3 Layout Plans

Site delineation including work zones and sketches are included with the Work Plan. This plan may be modified upon release of the Project Specification.

12.4 Respiratory Protection Plan

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used. Respiratory protection for this project will be evaluated on a case specific basis. At this time the use of respiratory protection is not anticipated, but is available if is required.

The criteria for determining respirator need have been evaluated based on the site contaminants; expected levels of protection are outlined in Section 5.1. Air monitoring will be conducted to confirm that respiratory protection levels are adequate (see Section 7.0 HSP). All respirator users will be OSHA trained in proper respirator use and maintenance. The HSO and crew leaders will observe workers during respirator use for signs of stress. The HSO, Project Manager, CIH, and COM will also evaluate the implementation of the HASP, periodically, to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.

12.5 Lead Abatement Plan

Not Applicable.

12.6 Asbestos Abatement Plan

Not Applicable.

12.7 Abrasive Blasting

Not Applicable.

12.8 Confined Space

Confined Space Entry Procedures will be available if required. At this time the use of confined space entry procedures is not anticipated.

12.9 Hazardous Energy Control Plan

This program establishes lockout practices of energy sources that could cause injury to personnel involved at the work site. The lockout program covers all employees and outside contractors affected by the cleaning, repairing, servicing and adjusting of prime movers, machinery, and equipment. Only authorized employees will perform such work.

- Authorized employees will be instructed in lockout/tagout procedures by their supervisor. Each new or transferred employee will be instructed by the supervisor in lockout procedures. A sufficient number of tags and padlocks will be supplied. During each phase of construction, a representative from JV I will be present while the electrical supervisor begins the lock out/tag out process.
- All equipment will be locked out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Do not attempt to operate any switch, valve, or other energy-isolating device bearing a lock.
- Documented periodic inspections will be made periodically by supervisors to ensure that each procedure is being properly followed. The HSO will ensure these inspections are being performed and keep on record the inspection reports on the job site. The inspection must include a review addressing the employee's responsibilities. Documentation is to include the date of the inspection, equipment on which the procedure was being utilized, the employees involved, and the person performing the inspection.
- Authorized employees will be certain as to which switch, valve, or other energy isolating devices apply to the equipment being locked out. More than one energy source may be involved. Any questionable identification of sources will be cleared through the supervisors.
- To begin the lockout process, use the following items as a guide. If for any reason the following items are in question, contact your immediate supervisor before moving forward. If more than one individual is required to lock out equipment, each person will place his own personal lock on the energy isolating device(s). One authorized individual and a competent person from the prime contractor (JV I) with the knowledge of the crew, may lock out equipment for the whole crew. In such cases, it is the responsibility of the individual to carry out all steps of the lockout procedure and inform the crew when it is safe to work on the equipment. Additionally, the authorized individual will

not remove a crew lock until it has been verified that all individuals are clear and a prime contractor competent person is present.

  - Notify all affected employees that a lockout is required.
  - If the equipment is operating, shut it down by the normal stopping procedure.
  - Operate the switch, valve, or other energy isolating devices so that the energy source(s) is disconnected or isolated from the equipment.
  - Stored energy, such as capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc., must also be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
  - Lockout energy isolating devices with an assigned individual lock. A second lock will be used if possible by the superintendent.
  - After ensuring that no personnel are exposed and as a check on having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate. CAUTION: Return operating controls to the neutral position after the test.
  - Attach a completed accident prevention tag and/or sign on the controls of the machine. The identification tag and/or sign will be coordinated with the electrical contractor and the prime contractor. A JV I representative will then make known to the facility personnel affected by this operation to familiarize them with the identification of these tags or signs and the procedures in which the contractors will be working by, and the point of contact of the electrical supervisor.
  - The equipment is now locked out.

- To restore equipment to service, use the following items as a guide. If for any reason the following items are in question, contact your immediate supervisor before moving forward.
  - When the job is complete and equipment is ready for testing or normal service, check the equipment area to see that no one is exposed.
  - When equipment is clear, remove all locks. The energy isolating devices may be operated to restore energy to the equipment. There must be a supervisor from the electrical contractor and the prime contractor present.
- The following checklist for lockout training is a minimum requirement to provide to new employees. The supervisors must sign, date, and retain in their own records this information. The supervisor must also delivery a copy of this training to the Site Safety Officer.
  - Explain the significance of why a machine is locked or tagged out.
  - Explain what an employee is to do (and not do) when encountering a tag or lock on a switch or device they want to operate.

  - Explain the importance of notification of affected employees.
  - Show the employee the location of all locks, tags, and lockout devices.
  - Explain how to recognize the applicable hazardous energy sources.
  - Explain the type(s) and magnitude of energy to be isolated on the machinery and how to control that energy.
  - Explain the proper sequence of locking out.
- All utility outages will follow the contract specifications, EM 385-1-1 and OSHA standards. The contractors will follow the above information as well as the following:
  - The contractor will supply the required tags and/or locks for each utility outage.
  - PWC Utility outages will be conducted with PWC Utilities, ROICC, the Contractor and sub-contractor.
  - Interior building/ facility utility outages will be coordinated with Facility Manager, ROICC, the Contractor and sub-contractor.
  - A preparatory meeting will be held prior to all electrical work and utility outages, this meeting will also cover any safety issues that may pertain to the scope of work. The Activity Hazard Analysis will be reviewed and any additional concerns will be annotated on this form.

12.10 Critical Lift Procedures

Not Applicable.

12.11 Contingency Plan for Severe Weather

At this time the use of a Hurricane Preparedness Plan is not required.

12.12 Access and Haul Road Plan

Not Applicable.

12.13 Demolition Plan

Not Applicable.

12.14 Emergency Rescue (Tunneling)

Not Applicable.

12.15 Underground Construction Fire Prevention and Protection Plan

Not Applicable

12.16 Compressed Air Plan

Not Applicable

12.17 Form Work and Shoring Erection and Removal Plans

Not Applicable

12.18 Lift Slab Plans

Not Applicable

12.19 Health and Safety Plan

The JV I Site Specific Health and Safety Plan is included with this submission.

12.20 Blasting Plan

Not Applicable

12.21 Diving Plan

Not Applicable

12.22 Alcohol and Drug Abuse Prevention Plan

JV I substance abuse procedures are on file.

13.0 Contractor Information to Meet the Requirements of the Major Sections of EM-385-1-1

In addition to this Accident Prevention Plan, JV I has prepared a Site-Specific Health and Safety Plan to meet the major requirements of USACE Manual 385-1-1.

Attachment 16

COMNAVREG MIDLANT Instruction 11300

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION, MID-ATLANTIC
1510 GILBERT ST.
NORFOLK, VA 23511-2737

IN REPLY REFER TO:
COMNAVREG MIDLANT
INST 11300.1
REG ENG/DRE
03 DEC 2004

COMNAVREG MIDLANT INSTRUCTION 11300.1

From: Commander, Navy Region, Mid-Atlantic

Subj: EXCAVATION AND MARKING OF SUBSURFACE UTILITIES

Ref: (a) 29 CFR 1926.650-652
(b) Virginia Underground Utility Damage Prevention Act (VAC Title 56, Chapter 10.3)
(c) Virginia Professional Excavators Manual, Miss Utility of Virginia
(d) Virginia Underground Utility Marking Standards, Miss Utility of Virginia
(e) COMNAVREGMIDLANTINST 11011.11

Encl: (1) Site and Utility Owner Information
(2) Cable Installation Request (CIR)

1. Purpose. This instruction establishes a uniform procedure for marking subsurface utilities in the Navy Region, Mid-Atlantic area of responsibility so as to minimize damage to existing subsurface utilities as a result of excavations.

2. Scope. Commander, Navy Region, Mid-Atlantic (COMNAVREG MIDLANT) is the approval authority for excavation and marking subsurface utilities on Navy installations in the Mid-Atlantic Region. This instruction applies to all Navy installations within Virginia except the Norfolk Naval Shipyard and adjacent Southgate Annex and Scott Center sites. Navy installations in Pennsylvania are covered by local instructions tied to the laws of Pennsylvania and agreements associated with the privatization of utilities at the Philadelphia Navy Yard. All excavations shall comply with the requirements of reference (a) in addition to references (b), (c), and (d), found at http://www.state.va.us/scc/division/.

3. Definitions

a. Excavation. Any operation in which earth, rock, or other material in the ground is moved, removed, or otherwise displaced by means of any tools, equipment, or explosives, and

includes, without limitation, grading, trenching, digging, ditching, dredging, drilling, auguring, tunneling, scraping, cable, or pipe plowing and driving, saw-cutting, soil borings, wrecking, razing, rendering, milling, horizontal boring, moving or removing any structure or mass of material.

b. Excavator. Applies to any Government forces, or contractor, military or civilian personnel, performing an excavation.

c. Utility. Applies to the following systems: water, electric, sewer, storm sewer, fiber optics, WAN/LAN, other communications cables, fire alarm, security alarm, steam, natural gas, cable television, compressed air, telephone, fuel/oils, street lighting, grounding mats, and lightning protection cabling. Although not technically utilities, the following environmental systems will also be marked: Oily Water-Waste Oil (OWWO) Piping; Intrinsic Remediation (IR) Wells; IR waste collection piping; and underground storage tanks.

d. Utility Operator. Applies to any Government or contractor owner or operator/maintainer of utility systems within the boundaries of Navy property. The following examples of operators in the region: FISC fuels, Naval Facilities Engineering Command, Mid-Atlantic (NAVFAC MIDLANT) Utilities, Naval Computer and Telecommunications Area Master Station, Atlantic (NTCAMS LANT), Regional Environmental; Station Public Works Officers (PWOs); and Electronic Data Systems (NMCI).

4. Discussion

a. All excavations must be approved through the site approval process outlined in enclosure (3) to reference (e) prior to entering into the excavation permitting process. All excavations must be thoroughly researched and cleared by local Utility Operators through the Virginia Utility Protection Services, Inc. (Miss Utility of Virginia, 1-800-552-7001) Notification System. The process of clearing areas for excavation is the responsibility of the Regional Engineer (REG ENG). The excavator is responsible for ensuring all Utility Operators have marked the proposed construction site prior to commencing any work per the guidelines set forth in reference (b). The excavator maintains the responsibility to dig carefully as well as liability for damage caused to utilities that have been properly located/marked during the excavation process.

b. In the event of an emergency situation during normal working hours, 0700-1600, Monday through Friday, the excavator shall contact the NAVFAC MIDLANT Trouble Desk for the location of the excavation in addition to Miss Utility of Virginia at 1-800-552-7001. Station trouble desk contact information is provided in enclosure (1). Resident Officer in Charge of Construction (ROICC) contractors shall contact their ROICC representative, who will in turn contact the trouble desk.

c. In the event of an emergency situation outside of normal working hours, the excavator shall notify the NAVFAC MIDLANT Utilities Department Regional Operation Center in Building P-1, Naval Station, Norfolk at 445-6868, in addition to Miss Utility of Virginia.

5. Action. The following information identifies actions and responsibilities associated with the digging permit process:

a. Excavator. Is responsible for notifying Miss Utility of Virginia of any planned excavation on Navy property (and its easements) and obtaining clearance through the Miss Utility Notification Center prior to excavation. Ticket status through Miss Utility can be obtained by calling 1-800-552-3120.

(1) Excavator shall mark the limits of proposed excavation on the ground in white mark-out paint (or with wooden stakes in case of standing water or heavy rain conditions).

(2) If new utilities are installed or if the actual locations of the utilities uncovered differ from those marked, the excavator shall provide a copy of as-built drawings noting these new utilities or actual locations to the design agent or station PWO (when no design agent) upon completion of the work (via ROICC representative for ROICC contractors). This document shall serve as an as-built record of the excavation. The excavator shall exercise extreme caution during demolition/ excavation. Location of the known existing utilities indicated on subsurface drawings is approximate. Should excavator uncover any items or artifacts that they suspect might have historical value, they are to stop all work immediately. Excavator will then be responsible for notifying the station PWO (through the station's trouble desk) who will then coordinate a site visit with the appropriate State Historic Preservation Office (SHPO) representative in order to determine the authenticity of the uncovered object. ROICC contractors shall contact their ROICC representative who will notify the station PWO. Only after receiving the approval of the SHPO representative will further excavation be permitted.

(3) If the excavator intends to install communication lines on Navy property, approval must be obtained from NCTAMS LANT via the Cable Installation Request (CIR) (enclosure (2)).

b. Utility Operators. Organizations owning or operating subsurface utilities in the Navy's Mid-Atlantic Region on both Navy property and on Navy easements shall, without cost to excavators:

(1) Maintain up-to-date, reproducible records of all subsurface utilities for which the command is responsible, and make copies of these records available to Government commands and agencies and authorized excavators.

(2) Maintain an active account with Miss Utility of Virginia and receive, manage, and respond to all requests for marking of their subsurface utilities and structures within the timeframes outlined in the agreement with Miss Utility of Virginia.

(3) Provide Miss Utility of Virginia with current points of contact for subsurface marking of utilities.

(4) Mark subsurface utilities, per reference (d). Current color codes and symbols are indicated below for convenience. This work may be performed by Government forces or by contractors.

Color Codes for Marking Subsurface Utility Lines	
Safety Red	Electric power distribution and transmission
High Visibility Safety Yellow	Gas, oil, and petroleum products distribution and transmission, dangerous materials, product lines, and steam lines
Safety Alert Orange	Telecommunication systems, police and fire communications, cable television
Safety Precaution Blue	Potable water systems
Safety Green Safety Precaution Purple	Sewer systems and drain lines Reclaimed Water, irrigation, and slurry lines
White	Proposed excavation

c. Design Agent, ROICC and Facility Support Contracts (FSC). These parties administer contracts and are responsible for ensuring that all of their contractors and their sub-contractors coordinate their excavations through Miss Utility of Virginia. Requirements must be addressed in all contract specifications prior to award process.

d. NAVFAC MIDLANT, Utilities Department Regional Operations Center, Building P-1, Norfolk. Receives after-hours emergency requests and notifies NAVFAC MIDLANT Command Duty Officer (CDO). Tracks response to after-hours emergency request and reports accomplishment to NAVFAC MIDLANT CDO.

e. PWO. Each station PWO shall be designated as a Utility Operator and maintain an active account with Miss Utility of Virginia for the purpose of identifying systems not owned by a specific government organization or third-party contractor (storm sewer systems, for instance). PWOs shall actively monitor ongoing excavations on their base through site visits and liaison with ROICC and Miss Utility of Virginia.

f. NCTAMS LANT. NCTAMS LANT Base Communications Office (BCO) will conduct a technical review and approve/disapprove CIRs within 10 working days of receipt.

6. Damages. Unknown subsurface utilities may exist which cannot be located by standard procedures. Extreme caution must be taken in areas where contract documents indicate the existence of utilities. Miss Utility of Virginia bylaws of reference (b) and contractual arrangements shall govern liability for damaged utilities associated with excavations on Navy property and easements.

F. F. Aucremanne

F. F. AUCREMANNE
Chief of Staff

Distribution: www.cnrma.navy.mil

Point of Contact Listing

NMCI Contacts

Site	Site Manager	Site Manager Office Number	Site Manager Cell Number	Site Manager Email
NSA Mechanicsburg	Lee Hetrick	(717) 791-2094	(717) 443-0915	lee.hetrick@eds.com
NSA Philadelphia	Pete Mastrovito	(215) 722-9400	(215) 651-8218	pete.mastrovito@eds.com
Chambers Field, Naval Station Norfolk	Kevin Potts	(757) 440-5523	(757) 615-2624	kevin.potts@eds.com
NAB Little Creek	Debra Helle	(757) 318-7238	(757) 576-1075	deb.helle@eds.com
Naval Station Norfolk	Dave Stack	(757) 963-1072	(757) 450-8880	dave.stack@eds.com
NAVSHIPYD Norfolk (shipyard)	Gabriela Rangel	(757)396-1510	(757) 635-5676	gabriela.rangel@eds.com
NSA Norfolk	Jim Williams	(757) 836-6907	(757) 575-6624	jwilli03@eds.com
NAS Oceana/Dam Neck Annex/St. Julien's Creek	Horace Moss	(757) 417-0475	(757) 371-5354	horace.moss@eds.com
NWS Yorktown/Cheatham Annex	Bill Yost	(757) 887-8250	(757) 344-6596	bill.yost@eds.com

Trouble Desks: P-1 is located at NAVSTA, 445-6868/9531 (after hours)

Installation Covered	Trouble Desk Location	Trouble Desk Telephone Number
NSA Northwest	Bldg. 38	(757)421-8110
NSA Norfolk (COMLANTFLT and Camp Allen)	Bldg. NH-140	(757)836-1478
Naval Station Norfolk	Bldg. Z-140	(757)444-4431
NAB Little Creek	Bldg. 3165	(757)462-7285 ext. 364
NAS Oceana/Dam Neck Annex	Bldg. 820	(757)433-2847
NWS Yorktown/Cheatham Annex	Bldg. 16	(757)887-4900
Naval Medical Center, Portsmouth	Bldg. 273	(757)953-5664
NAVSHIPYD Norfolk / St. Julien's Creek Annex	Bldg. 174, NNSY	(757)396-5856/5857
Regional Environmental Svc Desk (all stations)	Bldg. LP-24	(757)444-7528
Regional ECC/Fire Department (all stations)	Bldg N-26, NAVSTA	(757)444-2324/2326

NCTAMS LANT POCs

Site	POC Name	Office Number	Cell Number
NSA Mechanicsburg	Bill Davis	(215)697-4000	(856)303-1448
NSA Philadelphia	Bill Davis	(215)697-4000	(856)303-1448
PNBC Philadelphia	Greg Radziewicz	(215)897-6823	(215)888-5432
NAS JRB Willow Grove	Lil Spurgeon	(215)443-6225	(215)249-8165
Naval Station Norfolk/NSA Norfolk	Sharon Armstrong	(757)443-9087	(757) 521-1001 (pgr)
NAB Little Creek	Sharon Armstrong	(757)443-9087	(757) 521-1001 (pgr)
NNSY Norfolk (shipyard)	Bob Harris	(757)396-1800	(757)621-6878
NSA Norfolk, Northwest Annex	Janet Dumont	(757)421-8787	(757)621-6877
NAS Oceana/Dam Neck Annex	Carol Hawkins	(757)433-3230	(757) 621-6876
NWS Yorktown/Cheatham Annex	Cheryl Davila	(757)887-7724	(757)621-6875

Cable Installation Request

Date: _____

From: (Base serving the command/activity requesting service)

To: Commanding Officer, Naval Computer and Telecommunications Area Master Station, Atlantic (Code N2)

Subj: CABLE INSTALLATION REQUEST AT (Command/Activity or Site)_____

1. REQUESTING ACTIVITY: (command/activity requesting service)

2. BASE APPROVAL AUTHORITY: (Base Communications Officer at NTCAMS LANT)

3. PROJECT NUMBER: (assigned by base BCO/POC)

4. BASE POINT(s) of CONTACT:

POC NAME:

PHONE NUMBER: FAX NUMBER:

INTERNET ADDRESS:

5. REQUIREMENT: (brief narrative)

6. PROJECT SUMMARY: (describe how project satisfies requirement)

7. PROJECT DESCRIPTION: (include drawings, full details of project, and site approval if required)

8. POA&M: (time/event based for cable installation)

9. ESTIMATED PROJECT COST (cable installation portion only): $

10. ALTERNATIVE SOLUTIONS: (include reason for non-selection)

11. REMARKS:

Attachment 17

NAVY Mid-Atlantic Fire Prevention Procedures and Requirements

NAVY REGION MID-ATLANTIC FIRE & EMERGENCY SERVICES

MEMORANDUM

From: Chief, Fire Prevention
To: Contractors Performing New Construction, Additions, or Renovations within the Navy Region Mid-Atlantic Fire & Emergency Services Complex

Subj: Construction Site Fire Prevention Requirements and Regulations

Encl: (1) Construction Site Fire Prevention Guidelines
(2) CNRMA 11320.11, ROICC / NAVFAC PWC / CBU / CONTRACTOR Responsibilities
(3) Preconstruction Conference Report

1. In accordance with Enclosure (2), contractors performing new construction, additions, or renovations to facilities within the Navy Region Mid-Atlantic Fire & Emergency Services complex are required to comply with reasonable base orders concerning Fire Prevention and Safety.

2. This guideline has been prepared to ensure applicable Fire Prevention Regulations are complied with, and will serve as a reference for any questionable matters concerning Fire Prevention and/or Fire Safety. In addition, construction sites will be inspected weekly by a Fire Prevention Inspector, as required.

3. The site specific Fire Prevention Offices are available if additional guidance is needed. However, contractors should first attempt to resolve any questionable matters regarding Fire Prevention with their ROICC Inspector. Telephone numbers for site specific Fire Prevention Offices are as follows:

a. SEWELLS POINT / LITTLE CREEK FIRE DISTRICT:
Little Creek: 462-2424
Sewells Point: 322-2416

b. PORTSMOUTH / PENINSULA FIRE DISTRICT:
Yorktown Naval Weapons Station and Cheatham Annex: 847-7872 / 3 / 4 / 5
Norfolk Naval Shipyard, Naval Hospital, St Julians Creek, and Craney Island: 396-3338 Div. 396 3335 6

c. VIRGINIA BEACH DISTRICT:
Dam Neck: 492-6336
Oceana: 433-2407

for file

4. All fires, regardless of size, will be reported to the base Fire Department by using a fire alarm pull box and telephone. Extinguished fires will also be reported, by telephone only.

5. TO REPORT A FIRE BY TELEPHONE, DIAL:

a. SEWELLS POINT / LITTLE CREEK DISTRICT:
   Little Creek: 462-4444 / 4445
   Sewells Point: 444-3333

b. PORTSMOUTH / PENINSULA DISTRICT:
   Yorktown Naval Weapons Station and Cheatham Annex: 887-4911
   Norfolk Naval Shipyard and St Julians Creek:
      On base: 911 (396 and 967 exchanges ONLY)
      Off base or commercial phone: 396-3333
   Naval Hospital: 396-3333
   Craney Island: 322-9911

c. VIRGINIA BEACH DISTRICT:
   Dam Neck: 492-6333
   Oceana: 433-9111

NAVY REGION MID-ATLANTIC FIRE & EMERGENCY SERVICES

CONSTRUCTION SITE FIRE PREVENTION GUIDELINES

1. FIRE REPORTING

a. All fire will be reported to the site specific Fire Department, regardless of size.

b. TO REPORT A FIRE, DIAL:

(1) SEWELLS POINT / LITTLE CREEK DISTRICT:
Little Creek: 462-4444 / 4445
Sewells Point: 444-3333

(2) PORTSMOUTH / PENINSULA DISTRICT:
Yorktown Naval Weapons Station and Cheatham Annex: 887-4911
Norfolk Naval Shipyard and St Julians Creek:
On base: 911 (396 and 967 exchanges ONLY)
Off base or commercial phone: 396-3333
Naval Hospital: 396-3333
Craney Island: 322-9911

(3) VIRGINIA BEACH DISTRICT:
Dam Neck: 492-6333
Oceana: 433-9111

c. Extinguished fires will be reported by telephone only.

2. FIRE EXTINGUISHERS

a. Fire extinguishers will be furnished and maintained by contractor, as required by Fire Department.

b. At least one approved fire extinguisher will be provided in plain sight on each floor at each usable stairway or exit.

c. Fire extinguishers located within the buildings will not be removed from their locations, except to fight a fire.

d. Suitable fire extinguishers will be provided on manned equipment utilizing liquid fuel.

3. FIRE PROTECTION EQUIPMENT

a. All Fire Protection equipment (alarm systems, sprinkler systems, fixed suppression systems) will be maintained in operating condition at all times, unless deactivation of a system is necessary in order to perform the required work, or if there is a possibility of accidental activation due to the nature of the work being performed. If this is the case, the ROICC Inspector will be responsible for contacting NAVFAC Public Works to have these systems placed in or out of service.

b. Any Fire Protection system placed out of service will be returned to service as soon as possible. Whenever an alarm system is placed out of service or returned to service, the Fire Department will be notified. Telephone numbers for non-emergency calls to the Emergency Communications Center / Fire Dispatch Offices are as follows:

(1) SEWELLS POINT / LITTLE CREEK DISTRICT:
Little Creek: 462-4445
Sewells Point: 444-2324

(2) PORTSMOUTH / PENINSULA DISTRICT:
Yorktown Naval Weapons Station and Cheatham Annex: 887-4676
Norfolk Naval Shipyard, St Julians Creek and Naval Hospital: 396-3335
Craney Island: 322-9086

(3) VIRGINIA BEACH DISTRICT:
Dam Neck: 492-6400
Oceana: 433-2224 / 3300

c. Fire hydrants will not be used for any purpose without permission from NAVFAC Public Works.

4. CONSTRUCTION / ALTERATION / RENOVATION SAFEGUARDS

a. When new buildings are erected and the fire main system must be extended to provide adequate protection, it is highly desirable that the fire main extension, together with hydrant installation, be provided prior to the actual construction of the building. In the event that such a procedure is not possible, a temporary extension of the fire main system will be made in order to provide a water supply adequate for firefighting operations per US ARMY CORPS OF ENGINEERS MANUAL EM 385-1-1.

b. During construction operations, temporary ladders and catwalks will be installed in such a manner as to afford safe and rapid access for firefighters as well as an exit for workers. As the work progresses, completion of permanent stairway enclosures and other structural features that help to prevent the horizontal and/or vertical spread of fire is of great importance.

c. If an automatic sprinkler system is to be permanently installed, the water supply for the system will be ready and the sprinkler heads promptly installed after completion of the interior finish. Blank flanges, used to permit sprinkler protection by sections as construction progresses, will have gaskets conspicuously marked to assure removal as the sprinkler system is extended.

d. During alteration or renovation projects, where the building is protected by fire protection systems, such systems will be maintained operational at all times during alteration / renovation if feasible.

EXCEPTION: Where alteration / renovation requires modification of a portion of the fire protection system, the remainder of the system will be kept in service and the Fire Department will be notified. When necessary to shut down the system, the Fire Department will have the authority to require alternate measures of protection until the system is returned to service. The Fire Department will be notified when the system is shut down and when returned to service.

e. Notification of fire protection system shut down or return to service will be made to the site specific Emergency Communications Center / Fire Dispatch. This notification will be made BEFORE systems are shut down or returned to service. Shutting down or returning to service any fire protection system will be the responsibility of a qualified NAVFAC Public Works mechanic, activity mechanic, or a qualified contractor.

f. Fire lanes will be provided at the start of a construction project and be maintained throughout construction for access.

EXCEPTION: Fire lane markings are not required until completion of the building project.

g. Liquid fuel powered equipment, such as air compressors, hoists, and pumps will be located so that exhausts are directed away from combustible materials. Liquid fueled engines will be shut off during refueling operations to prevent ignition of gasoline vapors or liquid from possible spills or overflow.

h. Temporary wiring for construction operations will be carefully installed and supervised by a competent electrician.

i. Temporary electrical wiring will be protected from cranes, shovels, trucks, traffic and other construction equipment.

j. Permanent wiring systems will replace temporary systems as soon as removal of formwork will permit.

k. Temporary heating devices will be properly used and situated so that they are not likely to overturn or come in contact with combustibles. Temporary heating devices will be listed / approved by a "nationally recognized testing laboratory" (NRTL). A permit

for operating a heater will be obtained from the site specific Fire Prevention office prior to use.

l. Liquid fuel heaters are commonly used for temporary heating, however, combustible material such as canvas weather protection, is frequently ignited by liquid fuel fire heaters that are improperly installed or supervised. Safe arrangements, however, are possible and the provisions for permanent heating plants or a temporary heating system can often be substituted for the more hazardous liquid fuel heaters. When liquid fuel heaters are used indoors, carbon monoxide levels will be within OSHA and industrial hygiene levels.

m. A standing fire watch will be maintained if the fire evacuation alarm system is required to be disconnected during alteration or renovation projects.

5. HOT WORKS

a. Contractors have full responsibility for ensuring all equipment is in good repair and properly and safely operated on projects.

b. To obtain an inspection and authorization permit, dial the site specific Emergency Communications center / Fire Dispatch (non-emergency telephone numbers are listed in 3b above). The Fire Prevention Office should be contacted for advice concerning any questionable Fire Prevention matters. Telephone numbers for site specific Fire Prevention Offices are listed in Section 3 of Memorandum above.

c. Fire watches for hot work operations are required and must be maintained for at least one-half hour after stoppage / completion of the operation.

d. Sites requiring extended hot work operation may, at the discretion of the Fire Protection Inspector, be issued a Hazardous Operation / Process Designated Site Authorization Permit. This permit would allow continuous hot work operations at sites designated for this purpose without requiring daily hot work permits. New construction projects, exothermic welding and tar kettles are **excluded** from this provision. The designated site permit may be revoked at any time if the Fire Inspector feels the site is no longer safe for this type of operation.

6. TAR KETTLES / TORCH APPLIED ROOFING

a. All tar kettles / torch-roofing operations will be inspected prior to use by a Fire Prevention Inspector. Before either operation can begin, an authorization permit is required and will be issued upon inspection to a competent operator. A warm-up permit will be required for tar kettles at the start of each week prior to an operating permit being issued. This is to ensure that the automatic thermostat control is functioning properly.

b. All tar kettles will be attended by a minimum of one employee knowledgeable of the operations and hazards. This employee must be within 25 feet and have the kettle in sight at all times. There must be two (2) approved, 20B:C-rated fire extinguishers within 25 feet of the kettle, accessible and visible at all times. Fuel tanks must be secured and equipped with an operational pressure gauge. Roofing kettles will be maintained in good working condition and will also be free of excessive residue. Fire watch will remain one-half hour after stoppage / completion of work.

c. All torch roofing operations will have at least one (1) multi-purpose 2A:20B:C-rated fire extinguisher within 20 feet horizontal travel distance of the torch applied roofing equipment. Fire watch will remain one-half hour after stoppage / completion of work.

d. To obtain an authorization permit, dial the site specific Fire Prevention Offices listed in Section 3 of Memorandum above.

7. FLAMMABLE / COMBUSTIBLE LIQUIDS

a. Flammable / combustible liquids will be stored outside of and a safe distance from any structure.

b. Flammable / combustible liquids for daily use will be procured as needed, with any surplus returned to storage at the end of the workday.

c. All flammable liquids will be kept in nationally recognized testing laboratories (NRTL)- listed / approved safety cans, properly labeled with contents, and stored in NRTL-listed / approved flammable storage cabinets.

d. Only NRTL-listed / approved manually operated barrel pumps will be used to transfer flammable liquids.

8. HOUSEKEEPING

a. Any accumulation of combustible materials (paper, packing materials, sawdust, etc) will be removed from the work site at the end of each day and properly disposed of.

b. Proper clearance from buildings or structures will be maintained, taking care to ensure that piles of lumber , and other materials to be used in construction, do not interfere with the right of way.

c. Designated areas will be established for the dumping of refuse materials.

d. Paint rags and other materials subject to spontaneous ignition require proper hazardous material disposal.

CNRMA HRINST 11320.11
ROICC / NAVFAC PWC / CBU / CONTRACTOR RESPONSIBILITIES

1. OFFICER (OICC) AND RESIDENT OFFICER IN CHARGE OF CONSTRUCTION (ROICC) RESPONSIBILITIES

a. The OICC will provide liaison with the site specific Fire Prevention Office and contractors working on base to ensure proper fire prevention and protection requirements are followed within the scope of the contractor's responsibility to the government.

b. The ROICC will notify the site specific Fire Prevention Office of all new construction projects and dates or pre-construction conferences. A Fire Prevention representative will attend all pre-construction meetings.

2. NAVFAC PUBLIC WORKS OFFICER CONSTRUCTION RESPONSIBILITIES

a. The NAVFAC Public Works Officer will provide liaison with the site specific Fire Prevention Office and contractors, or Public Works Maintenance personnel, working on base with Public Works Construction Projects. This liaison is to ensure proper fire prevention and protection requirements are followed within the scope of the contractor's or Public Works Maintenance personnel responsibility to the government.

b. The Public Works Officer will notify the site specific Fire Prevention Office of all new construction projects and dates of pre-construction conferences. A Fire Prevention representative will attend all pre-construction meetings.

c. The Fire Prevention representative will provide the contractor or Public Works Maintenance personnel with information containing fire prevention instructions and fire safety precautions. This information will be maintained at the construction site.

3. CONSTRUCTION BATTALION UNIT (CBU) OFFICER CONSTRUCTION RESPONSIBILITIES

a. The CBU Officer will provide liaison with the site specific Fire Prevention Office and CBU personnel working on base with CBU projects to ensure proper fire prevention and protection requirements are followed within the project scope for responsibility to the government.

b. The CBU Officer will notify the site specific Fire Prevention Office of all new construction or renovation projects and dates of pre-construction conferences. A Fire Prevention representative will attend all pre-construction meetings.

c. The Fire Prevention representative will provide CBU personnel with information containing fire prevention instructions and fire safety precautions. This information will be maintained at the construction site.

4. CONTRACTOR'S RESPONSIBILITIES

a. Past experiences emphasizes the necessity for coordination and cooperation between construction personnel and operating forces. On a lump sum contract, contractors have, by the terms of the contract, primary responsibility for the protection of their work. The contractor is responsible for all damage to persons, or to other property that occurs as a result of negligence in connection with the prosecution of the work. Contractors have absolute responsibility with regard to their own work, and must exercise reasonable care in the protection of other base property.

b. In addition, the contractor will be required to comply with reasonable base orders concerning fire prevention and safety.

c. The Fire Prevention representative will provide the contractor with information containing fire prevention instructions and fire safety precautions. This information will be maintained at the construction site.

5. CONSTRUCTION / ALTERATION / RENOVATION

a. General:

(1) Construction projects pose many fire prevention and protection problems. During construction operations, many transient fire hazards are present. Fires that are not extinguished in the incipient stage are likely to spread more rapidly than they would in finished structures. In order to minimize the potential for fire, it is essential that proper fire prevention and safety practices be followed.

(2) Of primary importance are the provisions made for the early detection of fire and prompt notification of fire to site specific Emergency Communications Center / Fire Dispatch. Added precautions are required for the protection of projects that are remote from the site-specific location. In such cases, it may be necessary to resort to temporary or emergency measures in order to provide for fire protection. This dictates the necessity for indoctrination of all supervisory personnel in the fundamentals of fire protection and prevention measures necessary to create a safe environment during construction projects.

Appendix B
Quality Control Plan

Quality Control Plan
Site 19 – Removal Action

St. Juliens Creek Annex
Chesapeake, Virginia

Task Order 059

January 2006

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Under the

AGVIQ/CH2M HILL Joint Venture I Program
Contract N62470-03-D-4401

Prepared by

Virginia Beach, Virginia

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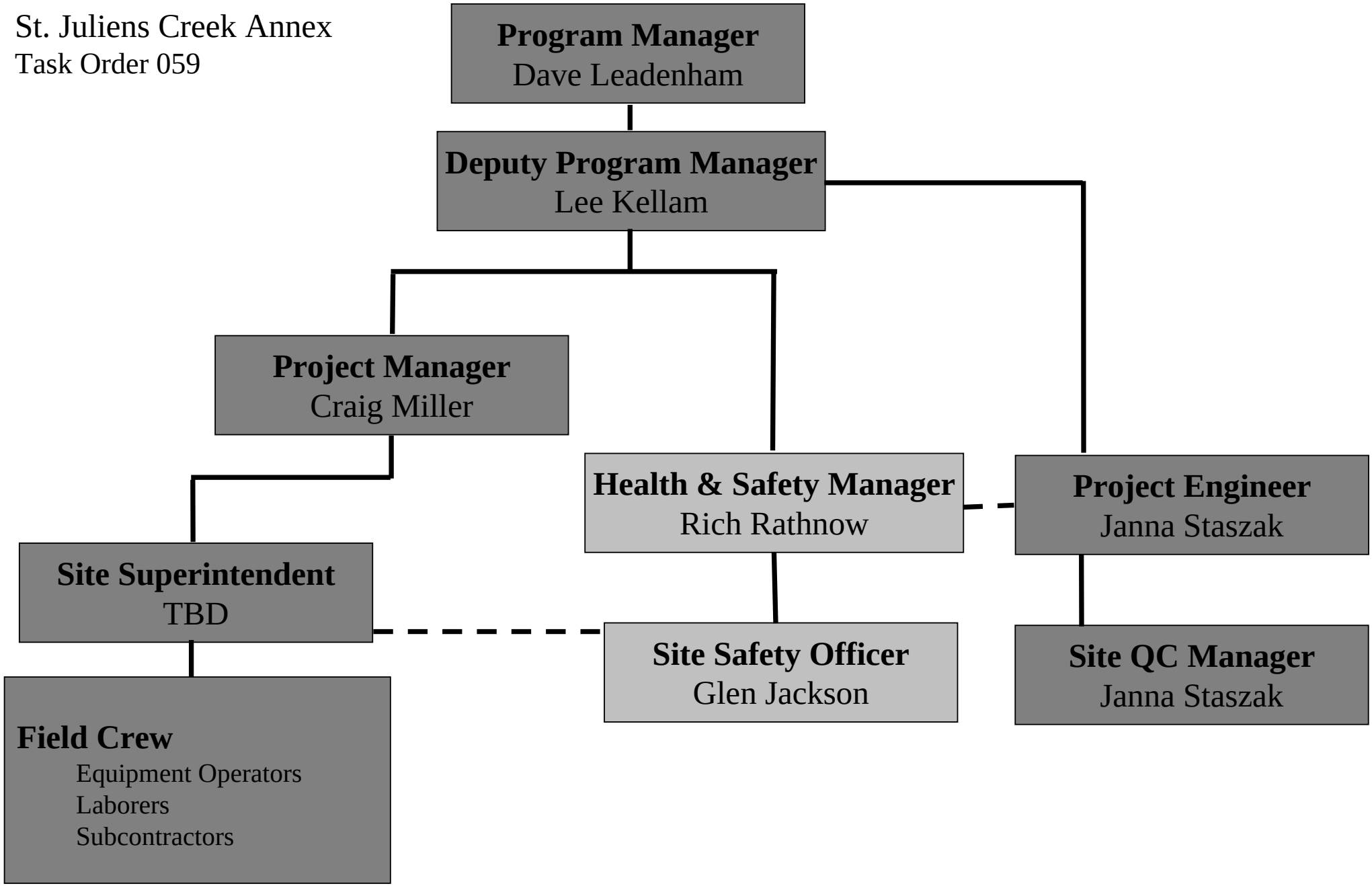
SECTION 1

Quality Control Organization

The relationship between the Quality Control (QC) Organization and production personnel of TO 059 is provided in the Organizational Chart, Figure 1-1.

Figure 1-1 – Organizational Chart

Site 19 Removal Action
St. Juliens Creek Annex
Task Order 059



SECTION 2

Names and Qualifications

Janna Staszak is designated Site QC Manager for TO 059.

The Site QC Manager's resume is provided as Figure 2-1. The required Construction Quality Management Training will be completed within 90 days of the award.

FIGURE 2-1
SITE QUALITY CONTROL MANAGER RESUME

Janna L. Staszak, P.E.

Civil Engineer

Education

B.S., Civil Engineering, Carnegie Mellon University, 2000

Professional Registrations

Professional Engineer: Virginia (2004, #040118)

Distinguishing Qualifications

- Performed landfill design and construction oversight
- Experienced with Corps of Engineers Quality Management for Construction program
- Prepared Erosion and Sediment Control Plans

Relevant Experience

Ms. Staszak is a civil engineer with the Environmental Services Business Group in CH2M HILL's Virginia Beach, Virginia office. She has over 6 years of engineering experience, including remedial design, remedial action, plan and report preparation (work plans, erosion and sediment control plans, excavation and material handling plans, environmental protection plans, construction closeout reports, etc.), quality control management, and project management. She is a member of the St. Juliens Creek Annex Partnering team, coordinating with Navy, CNRMA, USEPA, and VDEQ on a regular basis.

Representative Projects

Design Engineer; Paradise Creek Disposal Area; Norfolk Naval Shipyard; Department of the Navy; Portsmouth, VA; April 2004 – December 2004. Served as the design engineer of a 3-phase landfill cover/calcium hydroxide excavation/wetland design project for a 35-acre site. Coordinated with CAD designer to prepare the design drawings, performed various design calculations, and prepared the basis of design, erosion and sediment control plan, and project specifications.

Design Engineer; Site 4 – Landfill D; St. Juliens Creek Annex; Department of the Navy; Chesapeake, VA; April 2004 – December 2004. Served as a design engineer for a soil cover design for an existing landfill at a 10-acre site. Coordinated with CAD designer to prepare the design drawings, performed various design calculations, and prepared the basis of design, construction quality assurance plan, erosion and sediment control plan, and project specifications.

Civil Engineer; Pivotal Propane Peak Shaving Facility; AGL Resources; Chesapeake, VA; March 2004 – November 2004. Served as site representative for CH2M HILL during the demolition phase of construction. Observed on-site activities for quality of work and compliance with the scope of work in order to help advise the client. Assisted contractors with local and state permitting and compliance. Processed change orders to the demolition contract.

Janna L. Staszak, P.E.

Experience Prior to CH2M HILL

Shaw Environmental, Inc. Civil Technical Specialist, 1999 – 2004.

Performed various functions, including design, plan and report preparation, field engineering, project management, scheduling, and estimating for various CERCLA projects for the US Navy under the Remedial Action Contract. Projects involved excavation and consolidation of waste, installation of multi-media cap systems, installation of storm drainage and gas venting systems, stream excavation and restoration, and wetlands restoration. Performed design calculations, including storm water, channel sizing, volume, slope stability, sheet pile stability, settlement, and soil loss calculations.

Projects Representing QC Experience

Site QC Manager; Site 4 – Landfill D; St. Juliens Creek Annex; Chesapeake, Virginia; March through October 2005. Served as Site QC Manager for portions of the construction of a soil cover on a 8-acre landfill. Responsibilities included coordinating with subcontractors; selecting and inspecting materials that met project specifications; preparing, approving, and tracking submittals; overseeing testing; tracking project variances; monitoring construction for conformance with design and specifications; and preparing the construction closeout report.

Site QC Manager; Town Gut Landfill; Indian Head Division – Naval Surface Warfare Center; Indian Head, Maryland; November through December 2003. Served as Site QC Manager for a portion of the construction of a soil cover on a 5-acre landfill. Responsibilities included coordinating with subcontractors; selecting materials that confirmed with project requirements; verifying delivered materials met specifications; preparing, approving, and tracking submittals; performed/managed on and off-site testing; preparing agendas and minutes for and conducted bi-weekly QC meetings with the Navy, Base Environmental, ROICC representative, and A/E firm representative; prepared Daily QC Reports; maintaining red-line drawings; tracking project variances; monitoring construction for conformance with design and specifications; and preparing the construction closeout report, including QC program documentation and summary.

Field Engineer/Site QC Representative; Sites 1 and 2 Landfill Closure; Former Naval Surface Warfare Center White Oak, Silver Spring, Maryland; April 2001 through December 2001. Served as Field Engineer/Site QC Representative for construction of a multi-media cap system (geosynthetic clay liner, geocomposite, HDPE geomembrane, soil, gas vent system, gas monitoring wells, groundwater monitoring wells). Responsibilities included coordinating with subcontractors; selecting materials that confirmed with project requirements; verifying delivered materials met specifications; preparing, approving, and tracking submittals; performed/managed on and off-site testing; prepared agendas and minutes for and conducted bi-weekly QC meetings with the Navy, Base Environmental, ROICC representative, and A/E firm representative; prepared Daily QC Reports; maintained red-line drawings; tracked project variances; monitored construction for conformance with design and specifications; and prepared the construction closeout report, including QC program documentation and summary.

Field Engineer/Site QC Assistant; Fishing Point Landfill; Patuxent River Naval Air Station; Patuxent River Maryland; July 2000 through February 2001. Served as Field Engineer/Site QC Assistant for construction of a 2 foot soil cover on a 52-acre site. Responsibilities included

coordinating with subcontractors; selecting materials that confirmed with project requirements; verifying delivered materials met specifications; preparing, approving, and tracking submittals; performed/managed on and off-site testing; prepared agendas and minutes for and conducted bi-weekly QC meetings with the Navy, Base Environmental, ROICC representative, and A/E firm representative; prepared Daily QC Reports; maintained red-line drawings; tracked project variances; monitored construction for conformance with design and specifications; and prepared the construction closeout report, including QC program documentation and summary.

Professional Organizations/Affiliations

American Society of Civil Engineers

Society of American Military Engineers

Professional Development

US Army Corps of Engineers Construction Quality Management for Contractors Certification; October 2004

Standard First Aid and Adult CPR Certification; 2005

10-Hour Construction Safety Awareness; April 2004

Site Safety Coordinator Training; March 2004

State of Maryland Erosion and Sediment Control Certification, No. 26286; April 2003

8-Hour OSHA Refresher; 2001-2005

40-Hour OSHA Training; June 2000

Troxler Electronic Laboratories Certification; 2000

255 Data

Years Experience Previous to CH2M HILL: 4
CH2M HILL Hire Date: 2/16/2004

SECTION 3

Duties, Responsibilities, and Authority of QC Personnel

QC personnel will implement and maintain an effective QC Plan. The appointed Site QC Manager will not be appointed as the safety competent person as defined by EM 385-1-1.

The Site QC Manager is the manager of all QC activities. The Site QC Manager is required to conduct QC meetings, perform the three phases of control, perform submittal review and approval, ensure testing is performed, and provide the QC certifications and documentation required in this contract. The Site QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by the QC specialists, testing laboratory personnel, and any other inspection and testing personnel required by this contract.

No construction work or testing may be performed unless the Site QC Manager or representative is on the work site. The Site QC Manager shall report to an officer of JV I and shall not be subordinate to the Site Superintendent. The Site QC Manager and Site Superintendent must work together effectively. Both the Site QC Manager and Site Superintendent will be held responsible for the quality of work on the job.

SECTION 4

Outside Organizations

Outside organizations such as subcontractors employed by JV I for work under this task order is provided in Exhibit 4-1, which lists each firm's name and address and describes the services each firm will provide. This list will be maintained current and will be available for review.

Exhibit 4-1
Approved Consultant and Subcontractor List

Company Name and Address	Description of Services Provided
TBD	Transportation
TBD	Disposal Facility
TBD	Fill Material Source
TBD	Testing Laboratory
TBD	MEC Support
TBD	Utility Locator Services

SECTION 5

Appointment Letters

The Site QC Manager appointment letter is provided as Figure 5-1.

Figure 5-1

January 11, 2006

Ms. Janna Staszak, P.E.
CH2M HILL
5700 Cleveland St, Suite 101
Virginia Beach, VA 23462

RE: Site QC Manager
Contract N62470-03-D-4401
Task Order No. 059

Dear Ms. Staszak,

This letter will serve as your appointment as the Site Quality Control Manager on the referenced project and will also clarify your duties and authority in this position. In this position, you will be authorized to use available resources to satisfy all applicable requirements of the Program and Task Order Quality Control Plans.

This authorization specifically gives you the authority to direct removal and replacement or correction of nonconforming materials or work and stop work authority when continuation would be unsafe to personnel, harmful to the environment, or result in a significant degradation of quality.

You will be expected to work closely with the Program Manager, Site Superintendent and other project personnel, but you will not be directly responsible to anyone but me for resolution of quality issues when working in the capacity of Quality Control Manager.

If you have any question in the matter, please contact me.

Respectfully,

J. Lee Kellam, P.E.
Deputy Program Manager
CH2M HILL
11818 Rock Landing Drive, Suite 200
Newport News, VA 23606-4230

SECTION 6

Submittal Register

The Initial Submittal Register is provided as Exhibit 6-1. The status of each submittal will be recorded. The Submittal Register will be maintained and submitted at the end of each month.

EXHIBIT 6-1
SUBMITTAL REGISTER

CONTRACT NO.
N62470-03-D-4401

TITLE AND LOCATION
St. Juliens Creek Annex/Site 19-Removal Action

CONTRACTOR
Agviq - CH2M HILL Joint Venture I

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
			SD-01 Preconstruction Sumittals															
			Draft Work Plan															
			Final Work Plan															
			SD-06 Test Reports															
			Borrow Site Testing		G													
			Fill and backfill															
			Waste Characterization Analysis															
			Topsoil composition tests															
			SD-11 Closeout Submittals															
			Solid Waste disposal permit															
			Waste determination															
			documentation															
			Solid waste disposal report															
			Contractor Closeout Report															
			As-built drawings															
			Record of materials															

Exhibit 6-2

List of Personnel Authorized to Review and Certify Submittals

Specification Section	Submittal Type	Authorized Personnel
N/A	All	Site QC Manager
N/A	All	Project Engineer

SECTION 7

Testing Laboratory Accreditation

Testing laboratory accreditation requirements are addressed in the JV I contract, which governs TO 059. Construction materials–testing laboratories performing work for Navy construction contracts must be accredited by one of the laboratory accreditation authorities. The laboratory's scope of accreditation must include the ASTM standards listed in the paragraph titled "Construction Materials Testing Laboratory Requirements" as appropriate to the testing field. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

SECTION 8

Testing Plan and Log

A Testing Plan and Log has been prepared for the TO and is provided as Exhibit 8-1.

EXHIBIT 8-1
TESTING PLAN AND LOG

CONTRACT NO.
N62470-03-D-4401

TITLE AND LOCATION
St. Juliens Creek Annex/Site 19 Removal Action

CONTRACTOR
Agviq - CH2M HILL Joint Venture I

SPECIFICATION SECTION AND PARAGRAPH NUMBER	ITEM OF WORK	TEST REQUIRED	ACCREDITE DAPPROVED LAB		SAMPLE D BY	TESTED BY	LOCATION OF TEST		FREQUENCY	DATE COMPLETED	DATE FORWARDE D TO CONTR. OFF.	REMARKS
			YES	NO			ON SITE	OFF SITE				
	Waste Identification:	Full TCLP							As required by disposal facility			EPA 530/F-93/004
	Analyses shall conform to	Additional tests required by										40 CFR 261
	local, state, and federal	dispoal facility										SW-846
	criteria as well as to the											
	requirements of the disposal											
	facility.											
	Off-site Borrow	TCL VOCs							Once per source			CLP OLM04.2
		TCL SVOCs										CLP.OLM04.2
		TCL Pest/PCBs										CLP.OLM04.2
		TAL Metals & Cyanide										CLP
		TPH										SW846 9071B

SECTION 9

Procedures to Complete Rework Items

Rework Items will be documented on the Daily QC Report and on the Rework Items list, which is provided as Exhibit 9-1. This will be used to report and track rework Items. The Rework Items list will be submitted at the end of each month.

Exhibit 9-1
Rework Items List

CONTRACT NO.
N62470-03-D-4401

TITLE AND LOCATION
St. Juliens Creek Annex/Site 19 - Removal Action

CONTRACTOR
Agviq - CH2M HILL Joint Venture I

NUMBER	DATE IDENTIFIED	DESCRIPTION	CONTRACT REQUIREMENT (Spec. Section and Par. No., Drawing No. and Detail No., etc.)	ACTION TAKEN BY QC MANAGER	RESOLUTION	DATE COMPLETED

SECTION 10

Documentation Procedures

The following reports will be required:

Daily

QC Report, Contractor Production Report

Biweekly

QC Meeting Agenda, QC Meeting Minutes

Monthly

Submittal Register (Exhibit 6-1), Testing Plan and Log (Exhibit 8-1), Rework Items (Exhibit 9-1)

Documentation will be completed as discussed in ER 1180-1-6, "Construction Quality Management," U.S. Army Corps of Engineers (30SEP95).

SECTION 11

List of Definable Features

The Quality Control Inspection Plan, Exhibit 11-1, lists each specification section and definable feature of work with provisions for recording the corresponding checklist/report for each phase of the three-phase control process. As each control phase is satisfactorily performed, the Site QC Manager will record the corresponding checklist/report number and date.

Note: A definable feature of work is a task that is separate and distinct form other tasks and requires separate control procedures.

This list has been prepared to correspond to the activities of the project schedule. The list will be agreed upon during the Coordination and Mutual Understanding Meeting. The list will be keyed to the construction schedule. Each preparatory, initial, and follow-up phase checklist/report will reflect the construction activity number derived from the construction schedule.

EXHIBIT 11-1
Quality Control Inspection Plan

CONTRACT NO.
N62470-03-D-4401

TITLE AND LOCATION
St. Juliens Creek Annex/Site 19 - Removal Action

CONTRACTOR
Agviq - CH2M HILL Joint Venture I

SPECIFICATION SECTION	DEFINABLE FEATURE OF WORK	ACTIVITY NUMBER	CONTROL CHECK VERIFICATION					
			DATE	PREPARATORY PHASE CHECKLIST/REPORT NO	DATE	INITIAL PHASE CHECKLIST/REPORT NO	DATE	FOLLOW-UP PHASE CHECKLIST/REPORT NO
	Transportation and Disposal							
	Excavation							
	Backfill and Site Restoration							

SECTION 12

Procedures for Performing the Three Phases of Control

The Site QC Manager will prepare and maintain the personnel matrix, Exhibit 12-1, showing each section of the TO specification with identification of who will review and certify submittals, who will perform and document the three phases of control, and who will perform and document testing. This matrix should be completed as much as possible prior to and during site mobilization. The matrix will be maintained current by the Site QC Manager and will be available for review.

Exhibit 12-1
Personnel Matrix

Specification Section	Submittals to be Reviewed By	Three Phase to be Performed By	Testing to Performed By
	Site QC Manager	Site QC Manager	Site QC Manager

Appendix C
ESS Waiver Documentation

Date: June 2, 2005

To: Commanding Officer
Naval Ordnance Safety and Security Activity
ATTN: Code N5
101 Strauss Ave., BLDG D327
Indian Head, MD 20640-5555

From: Bob Schirmer

Subject: Explosive Safety Submission (ESS) Waiver Request for - Munitions and Explosives of Concern (MEC) Avoidance l at Installation Restoration Program (IRP) Site 19, St. Juliens Creek Annex, Chesapeake, Virginia (Figure 1)

Transmitted herein is the ESS waiver request prepared for the above referenced site. The waiver request was developed in accordance with NOSSAINST 8020.15 to seek approval for an exemption of the ESS requirement for the proposed MEC avoidance activities at IRP Site 19. An outline of the proposed activities is presented below. A more complete description of the technical and field approach will be provided to NAVFAC by the UXO contractor in a work plan following receipt of NOSSA's comments on this ESS waiver request.

Objective and Approach for MEC Avoidance

A removal action is planned at Site 19 to address soil contaminated with metals and polycyclic aromatic hydrocarbons (PAHs) (Figure 2). Although previous intrusive investigations at Site 19 have not encountered any MEC, those efforts have documented the presences of Material Potentially Presenting an Explosive Hazard (MPPEH) at the Site. The objective of the MEC avoidance effort will be to properly assess any MPPEH that is encountered along the access/egress lanes as well as in the excavation itself. In addition the UXO Subcontractor will insure that if MEC were to be encountered the proper notifications and actions to insure the safety of the field crew will be followed. Additional site details are provided in the waiver request form.

The general field approach for Site 19 is as follows:

1. Magnetometer-assisted surface clearance will be conducted in the areas where the soil removal activities are planned (Figure 2). The objective of the surface clearance is to remove any MPPEH or other explosive hazards that may exist at the ground surface of the project site thus providing safe access and egress to the project team members as they complete the soil removal activities utilizing heavy equipment, such as a backhoe.
2. Magnetometer-assisted survey will be continuous as soil is excavated. Any subsurface anomalies will be investigated using hand tools or similar equipment. UXO Technicians will serve as spotters while the excavations progress to the required dimensions. The rate of excavation will be determined by the type and quantity of anomalies encountered. UXO Technicians will observe the excavated materials to ensure no MPPEH or MEC is present.
3. Any MPPEH encountered will be removed. Inspection and disposal of all MPPEH will be performed by a qualified UXO contractor or the active-duty military EOD unit. If necessary, following the removal of Munitions Debris (MD), the area will be surveyed again to confirm all suspected anomalies have been investigated and cleared. If additional anomalies are detected, they will be investigated in the same manner as before.
4. If any MEC is encountered, all site activities will be immediately terminated, and an ESS will be submitted and approved prior to the continuance of activities.

Operational Risk/Hazard Assessment

An operational risk/hazard assessment has been performed for the above-listed tasks following procedures described in the OPNAVINST 3500.39A. Based on the historical information and previous investigation findings at Site 19, the operational risk is expected to be negligible. A copy of the hazard assessment is also included as an attachment. Because of the expected negligible risk, a waiver of the ESS requirement is requested.

Enclosures - Waiver Request Form
Operational Risk/Hazard Assessment
Figures 1 & 2

EXPLOSIVES SAFETY SUBMISSION
WAIVER REQUEST

Date:	June 2, 2005	Supporting EOD unit or UXO contractor:	EOD Mobile Unit 2 Det Norfolk or UXO Contractor-TBD
Site name:	Installation Restoration Program (IRP) Site 19: Building 190, St. Juliens Creek Annex (SJCA), Chesapeake, Virginia		
POC name:	Mr. Bob Schirmer (NAVFAC - Mid Atlantic)	POC phone/fax/e-mail:	(757) 444-2911 (757) 444-5822 robert.g.schirmer@navy.mil
Site history:	Building 190 was located at the confluence of Blows Creek and the Southern Branch of the Elizabeth River (Figure 1). The building historically handled loose ordnance materials and was used for loading explosives into ammunition. From the 1940s to the 1970s, Explosive D and Composition A-3 were used at Building 190. In mid-1977, all ordnance-handling buildings were decontaminated by flushing with chemical solutions and water. Prior to decontamination, Naval Ammunition Production Engineering Center (NAPEC) visually inspected the facilities and collected samples for chemical analysis to develop appropriate decontamination procedures for each building. At the conclusion of the decontamination process, NAPEC visually reinspected each building, collected samples for chemical analysis, and certified that the facilities were decontaminated. However, the level of decontamination was not specified and residues of ordnance may remain (NEESA, 1981). Building 190 was demolished sometime after 2000.		
Summary of actions taken to date and planned actions:	During a Relative Risk Ranking (RRR) data collection study in 1996 and Site Investigations (SI) in August 2003, December 2004, and April 2005, soil, groundwater , and sediment samples were collected. A qualified UXO avoidance subcontractor was on-site during all intrusive activities during the SI's. No Munitions and Explosives of Concern (MEC) was encountered during the investigations. Some chemical contamination (metals and polycyclic aromatic hydrocarbons [PAHs]) were identified in site soils and an Engineering Evaluation/Cost Analysis (EE/CA) will be completed in 2005 for a removal action. Intrusive activities, scheduled for the winter/spring of 2005/2006, include a soil removal action and subsequent backfilling with clean fill. The Site 19 area encompasses approximately 130, 679 sq ft (3 acres). The removal actions are planned to include a 2,866 sq ft (0.07 acres) area of metals contamination to 3 ft below ground surface and a 307 sq ft (0.007 acres) area of PAHs contamination to a depth of 4 ft below ground surface (Figure 2).		
Munitions encountered or believed to be present	No MEC, MC, or MPPEH has been encountered during the previous investigations at Site 19.		
Justification for not submitting an ESS:	Historical and previous in-field findings. Risk/hazard assessment is provided.		

Prepared By: Phil Balvocius, CH2M HILL, Inc., Munitions Response Team
Date: June 2, 2005

Site Name: IRP Site 19: Building 190, SJCA, Chesapeake, Virginia

Task: Intrusive activities, scheduled for the winter/spring of 2005/2006, include a soil removal action and subsequent backfilling with clean fill. The Site 19 area encompasses approximately 130, 679 sq ft (3 acres). The removal actions are planned to include a 2,866 sq ft (0.07 acres) area of metals contamination to 3 ft below ground surface and a 307 sq ft (0.007 acres) area of PAHs contamination to a depth of 4 ft below ground surface (Figure 2).

MGFD: N/A

Hazard Category	Hazard	Mishap Probability				**Mishap Probability**
I - May cause death	Category	A	B	C	D	A - Likely
II - May cause severe injury	I	1	1	2	3	B - Probably in time
III - May cause minor injury	II	1	2	3	4	C - May occur in time
IV - Minimal threat	III	2	3	4	5	D - Unlikely to occur
	IV	3	4	5	**5**	

RAC Definitions
1 - Critical
2 - Serious
3 - Moderate
4 - Minor
5 - Negligible

RAC = 5 based on analysis

File Path: V:\18gis\St-Juliens\Figures\cto14_site_investigation_various_sites.apr

LEGEND

- Site Boundary
- Extent of Metallic Slag Removal (Area = 2866 sq. ft.)
- Potential Extent of PAH Removal (Area = 307 sq. ft.)

N

0 50 100 Feet

Figure 2
Areas for Potential Removal
Site 19
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

DEPARTMENT OF THE NAVY
NAVAL ORDNANCE SAFETY & SECURITY ACTIVITY
FARRAGUT HALL BLDG D-323
23 STRAUSS AVENUE
INDIAN HEAD MD 20640-5555

8020
Ser N539/1162
12 Aug 05

From: Commanding Officer, Naval Ordnance Safety and Security Activity
To: Commanding Officer, Naval Facilities Engineering Command Mid-Atlantic

Subj: EXPLOSIVES SAFETY SUBMISSION (ESS) WAIVER REQUEST FOR ST JULIENS CREEK ANNEX, SITE 19

Ref: (a) E-mail ENGFLDACTMIDLANT (Code EV3) Mr. R. Schirmer/ NOSSA (N539) Mr. D. Murray of 8 Aug 05 (w/encl)
(b) NOSSAINST 8020.15, Military Munitions Response Program Oversight dtd 8 Mar 04
(c) NAVSEA OP 5, Revision 7
(d) DoD 4160.21-M
(e) DoD 4160.21-M-1

1. The Naval Ordnance Safety and Security Activity (NOSSA) reviewed the subject Explosives Safety Submission (ESS) waiver request as requested by reference (a), in accordance with references (b) and (c).

2. Based on the information presented in reference (a) and on the ESS criteria in Section 7 of reference (b), NOSSA waives the requirement for submission of an ESS at this time as follows:

a. Operations at the site are limited to contractor Unexploded Ordnance (UXO) technicians conducting a magnetometer-assisted surface clearance of the site in order to remove metallic debris, to possibly include Materials Potentially Presenting an Explosive Hazard (MPPEH). Following the surface clearance, UXO technicians will use magnetometers to continuously survey soils as they are excavated.

b. All recovered MPPEH must be inspected, certified, and verified in accordance with reference (d) and demilitarized in accordance with reference (e).

3. NOSSA understands that your operational risk/hazard assessment concluded the probability of encountering Munitions and Explosives of Concern (MEC) is negligible. NOSSA acknowledges that your proposal to have on-site UXO construction support during the soil removal activities is being undertaken as

a conservative measure, although not required for a negligible risk/hazard assessment.

4. At any time should you encounter MEC, you must stop all operations and submit an ESS.

5. The NOSSA point of contact for this ESS waiver is Mr. Douglas Murray, who can be contacted at DSN 354-4450 or commercial at 301-744-4450.

PAMELA G. CLEMENTS
By direction

Copy to:
CNO (N411; N45C)
COMNAVFACENGCOM (EN)
NOSSA ESSOLANT (N5L)

Appendix D
MEC Construction Support and Management Plan

CONSTRUCTION SUPPORT PLAN

FOR
MUNITIONS & EXPLOSIVES OF CONCERN (MEC) AVOIDANCE SERVICES

INSTALLATION RESTORATION PROGRAM (IRP) FOR SITE 19 OF ST. JULIENS CREEK ANNEX CHESAPEAKE, VA

Prepared For:

AGVIQ LLC / CH2M HILL
Environmental Services
4663 Haywood Rd. Suite # 208
Virginia Beach, VA 23455

Prepared By

105 West Tennessee Ave.
Oak Ridge TN, 37830

FEBRUARY 14, 2006

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1.1 Project Authorization 1
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2.2.1 Phase I - Mobilization 5
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APPENDICES

A Scope of Work
B Basic Safety Considerations
C MEC Construction Support for MEC Activities
D MEC Notification Procedure

LIST OF ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
BIP	Blow-In-Place
BRAC	Base Realignment and Closure
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPR	Cardio-Pulmonary Resuscitation
CWM	Chemical Warfare Material
DGPS	Differential Global Positioning System
DO	Delivery Order
DOD	Department of Defense
DQCR	Daily Quality Control Report
EMR	Electromagnetic Radiation
EOD	Explosive Ordnance Disposal
EOTI	Explosive Ordnance Technologies, Inc.
EZ	Exclusion Zone
FUDS	Formerly Used Defense Site
GPO	Geophysical Prove-Out
GSP	Global positioning system
HAZWOPER	Hazardous Waste Site Operations and Emergency Response
HE	High Explosive
ID	Identification Number
MEC	Munitions & Explosives of Concern
MIS	Management Information System
MP	Military Police
MPM	Most Probable Munition
MV	Millivolts
NAD83	North American Datum of 1983
OE	Ordnance and Explosives
OSHA	Occupational Safety and Health Administration
OSO	On-site Safety Officer
PM	Project Manager
POC	Point of Contact
PPE	Personal Protective Equipment
PRAC	Pre-placed Remedial Action Contract
PSO	Project Safety Officer
QC	Quality Control
QCP	Quality Control Plan
Q-D	Quantify-Distance
RTK	Real-Time Kinematic
SOP	Standard Operating Procedure
SOW	Scope of Work
SUXOS	Senior UXO Supervisor
SSHP	Site Safety and Health Plan
TSSDS	Tri-Service Spatial Data Standards

USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
UXOSO	Unexploded Ordnance Safety Officer
WP	White Phosphorous

CONSTRUCTION SUPPORT PLAN
FOR
MUNITIONS & EXPLOSIVES OF CONCERN (MEC) AVOIDANCE SERVICES

INSTALLATION RESTORATION PROGRAM (IRP) FOR
SITE 19 OF ST. JULIENS CREEK ANNEX
CHESAPEAKE, VA

1.0 CHAPTER 1 - INTRODUCTION

Explosive Ordnance Technologies, Inc. (EOTI) is performing Ordnance Explosive Avoidance activities in support of AGVIQ/CH2M HILL during the Remedial Action at Site 19 of St. Juliens Creek Annex, Chesapeake, VA. This is a Construction Support activity, in conjunction with work being conducted for the Mid-Atlantic Division of the Naval Facilities Engineering Command under the AQVIG/CH2M Hill Joint Venture I contract during the Installation Restoration Program (IRP) at Site 19 on St. Juliens Creek Annex (SJCA), Chesapeake, VA.

1.1 Project Authorization

This work plan has been prepared in accordance with Task Order (TO) No. CTO-0059, issued by the AGVIQ – CH2M Hill JV in conjunction with work being conducted for the Atlantic Division of the Naval Facilities Engineering Command under the AGVIQ-CH2M HILL joint Venture I contract during the Installation Restoration Program (IRP) at Site 19 on St. Juliens Creek Annex (NAVFAC Mid-Atlantic), Chesapeake, Virginia. AGVIQ, and its subcontractor, Explosive Ordnance Technologies, Inc. (EOTI), of Rumson, New Jersey, have prepared this Work Plan in accordance with the Scope of Work (SOW) dated January 17, 2006.

1.2 Purpose and Scope

The purpose of this investigation is to provide Munitions Constituents (MEC) Construction Support during the sampling & soil excavation. The MEC Construction Support will take place at the St. Juliens Creek Annex.. Anomalies resembling MEC will be identified and assessed for explosive hazards. The Scope of Work (SOW) for this project is included in **Appendix A**.

1.3 Site Location

Building 190, (Site 19) was located at the confluence of Blows Creek and the Southern Branch of the Elizabeth River. The building historically handled loose ordnance materials and was used for loading explosives into ammunitions. From 1940's to the 1970's, Explosive D and Composition A-3 were used at building 190. In mid –1977, all ordnance-handling buildings were decontaminated by flushing with chemical solution and water. Prior to the decontamination, Naval Ammunition Production Engineering Center (NAPEC) visually inspected the facilities and collected samples of chemical analysis to develop appropriate decontamination procedures for each building. At the conclusion of the decontamination process, NAPEC visually re-inspected each building, collected samples for chemical analysis,

and certified that the facilities were decontaminated. However, the level of decontamination was not specified and residues of ordnance remain (NEESA, 1981). Building 190 was demolished sometime after 2000. Since that time, the rail-spur that was associated with the building, located on the northern side has also been decommissioned and removed from the site.

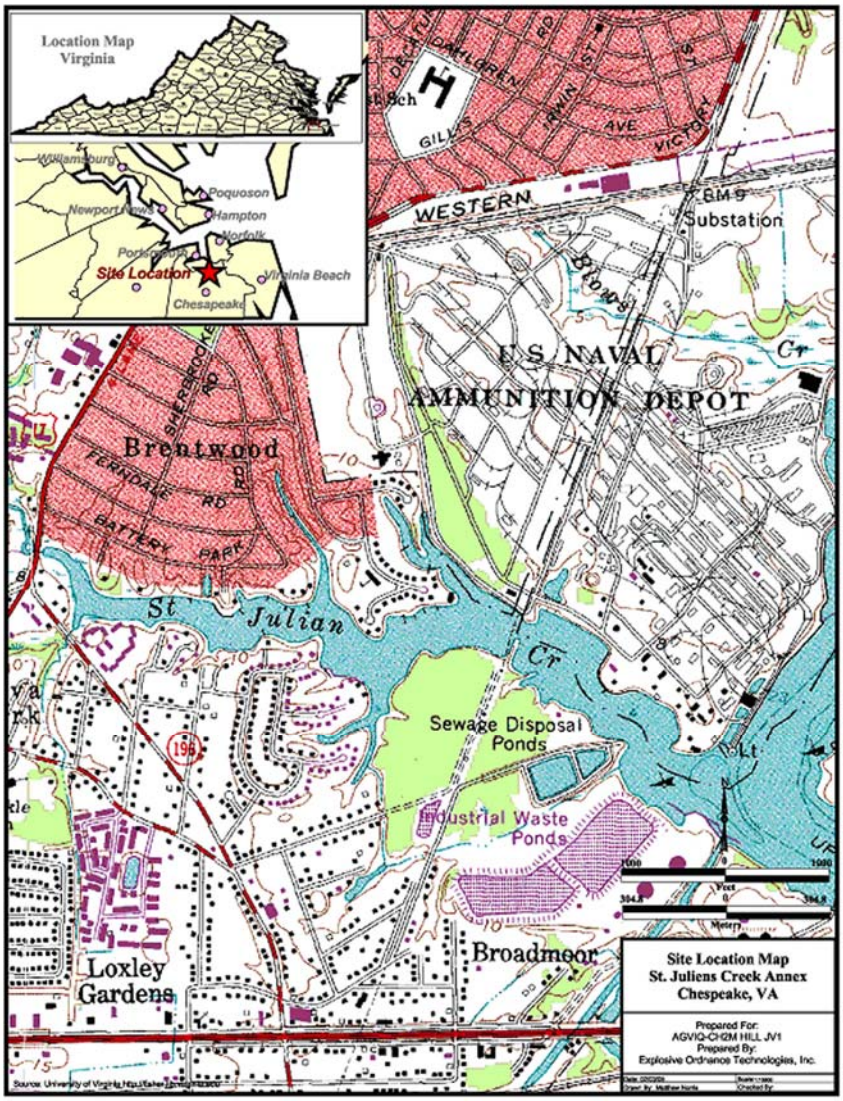


Figure 1-1
Site Location Map

2.0 CHAPTER 2 - TECHNICAL MANAGEMENT PLAN

The MEC Construction Support for Installation Restoration Program (IRP) of St. Julien's Creek Annex, Chesapeake, Virginia, will be conducted by a project team consisting of AGVIQ and Explosive Ordnance Technologies, Inc. (EOTI).

2.1 General Procedures

Guidance Documents and references under which this project is being conducted are as follows:

- DID OE-005-06 Site Safety and Health Plan
- EP 385-1-95a Basic Safety Concepts and Considerations for Munitions and Explosives of Concern (MEC) Response Action Operations
- OPNAVINST 8020.14, Department of the Navy Explosives Safety Policy
- NAVSEA OP-5 Volume1 Ammunition and Explosives Ashore: Safety regulations for Handling, Storing Production, Renovation, and shipping.

Construction Support will MEC Avoidance / Soil Sampling Support & soil Excavation.

Personnel

The MEC construction support team will consist of two persons having the following minimum qualifications:

- **UXO Technician III:** One UXO Technician III with experience supervising construction support activities will serve as the competent person overseeing OE operations.
- **UXO Technician II:** One UXO Technician II with experience implementing construction support activities.

  UXO Technicians will also have 40 hours of HAZWOPER training meeting the provisions established in 29 CFR 1910.120. If this 40 hour training course is more than 1 year old, the UXO Technicians will also have completed annual refresher training in accordance with 29 CFR 1910.120(e)(8) within the last 365 days. Documentation of this training will be provided prior to initiating fieldwork.

Areas To Be Inspected

During the Soil Sampling Support & Soil Excavation operations, the UXO Technicians will visually inspect the area where the field investigation / Soil Sampling teams are to work for MEC or other hazardous. The surface clearance will be assisted utilizing a hand held magnetometer will be conducted in the areas where the soil samples and soil removal activities are planned. EOTI will utilize White Metal Detectors where Shonstedts are ineffective.

Inspection Procedures

The UXO Technician III will oversee the UXO Technician during MEC Avoidance / Soil Sampling Support & Soil Excavation for Site 19 operations. The UXO Technician will be assisted during visual inspections by the use of a Schonstedt, Magnetic Locator which is capable of locating ferrous metals in the ground. Additionally, EOTI technicians may utilize an White Metal Detector when the Schonstedt does not meet required detection limits. The Schonstedt

will not be used in the vicinity of the backhoe or other vehicle where the vehicle would interfere with its operation, but will be used to assist in the observation of the excavation area and the stockpile. The UXO Technicians, in accordance with the conditions at the site, will determine detection settings for the Schonstedt.

Procedures to be used in the event MEC is located

If during intrusive activities, a MEC or other hazardous item is found, the UXO Technicians will mark and report the item for removal by notify the AGVIQ and other parties in accordance with the reporting procedures included in Appendix D. The suspected item will remain under constant surveillance until relieved by military EOD personnel. As this is an Ordnance Avoidance operation, no item will be touched or removed. Notification will be made to the AGVIQ/CH2M HILL Site Manager and the Site Safety and Health Officer. The item will be marked by surrounding it with 4 wooden stakes and encircling the stakes with flagging ribbon or caution tape. If flagging ribbon is used, the color will be different than the color used for any other purpose on site. All site personnel will be advised of the hazard and its location. No smoking or other flame producing activities will be permitted with 100 feet of the item. No fueling operations or other operations involving flammable materials will be permitted within 100 Feet of the item. Detailed information regarding the item, its identification, condition, and disposition will be recorded in the Daily Site Report.

The AGVIQ/CH2M HILL Site Manager and Site Safety and Health Officer will be notified immediately. They will notify local authorities in accordance with the procures in Appendix D. The UXO Technicians, the Site Safety and Health Officer, and the Site Manager will determine whether conditions permit sampling & soil excavation activities to continue safely pending response / approval from local authorities and disposal of the item.

In the unlikely event that a CWM item is found, all site personnel will withdraw upwind and secure the site. Immediate notification will be made to the AGVIQ Supervisor and local Hazardous Response Authorities. If any site personnel including visitors are exposed to toxic materials, decontamination will take place in accordance with the Standing Operating Procedures (SOP) for personnel decontamination outlined in EOTI's Safety & Health Program paragraph 25-5.

This site is not a suspected Chemical Warfare Materiel (CWM) site. However, if suspected CWM is encountered during any phase of work, all operations will cease immediately, personnel will immediately withdraw upwind from the work area, Local law enforcement and emergency response teams, and AGVIQ will be notified, who in turn will notify the local Explosive Ordnance Disposal (EOD) unit and the Atlantic Division of the Naval Facilities Engineering Command. The suspected item will remain under constant surveillance until relieved by military EOD personnel.

Based on information provided by AGVIQ in the SOW regarding the site and the lack of surface evidence of Ordnance-related scrap, it is not anticipated that surface MEC will be found. If a situation is encountered that MEC and or other hazardous items are located, EOTI UXO Technicians will visually identify and mark the MEC for removal by the local Explosive

Ordnance Disposal (EOD) unit and the Atlantic Division of the Naval Facilities Engineering Command. EOTI MEC Personnel will direct construction support personnel to move to a safety distance defined by MEC Technicians prior to identification of the MEC item. The ordnance item will be marked with four wooden stakes and encircled with flagging ribbon and or caution tape.

2.2 Project Execution

Project field activities consist of the following tasks:

- Mobilization
- Site Preparation and Safety
- MEC Avoidance support for Sampling & Soil Excavation
- Demobilization

The project will be accomplished in the field using a combined two-phase approach. The first phase will include mobilization, and site specific/safety training. The second phase will include MEC construction support during Soil Sampling Support & Soil Excavation, identification of MEC, and demobilization.

EOTI will furnish all labor, materials, equipment, supplies, utilities, etc. to complete the investigation of MEC-like anomalies identified..

Due to the inherent risk in this type of operation the team will be limited to a 40-hour workweek consisting of five 8-hour days while performing "OE Procedures" unless longer workweeks are approved by AGVIQ/EOTI management. The workday will be from 0800 hours to 1700 hours. Both the hours and days of operations may change, with the concurrence of the AGVIQ schedule and or weather related issues.

2.2.1 Phase I - Mobilization

EOTI will mobilize one UXO Technician III (Team Leader) and one UXO Technician II, with all certifications, resumes, licenses, equipment and materials to complete the Munitions Response effort listed in the SOW.

Due to the short duration of the project and limited number of personnel involved in the project at any given time, no site trailer will be mobilized by EOTI to the site.

In accordance with the SOW, no brush cutting or other site preparation is anticipated to conducted. Site conditions will be documented to aid in the preparation of the final report.

Following authorization from AGVIQ, EOTI will begin operations with mobilization to the site within 7 days to establish an operational capability at the work site. The goal of the mobilization is to ensure that proper attention is given to preparing and training for MEC operations. Actions performed will include:

- Identifying/procuring, packaging, shipping project equipment
- Setting up support facilities
- Testing communication equipment
- Finalizing subcontract(s) and operating schedules
- Transporting to and assembling the work force at the site
- Conducting site-specific training if required
- Arranging for and occupying personnel lodging facilities

2.2.2 Phase II - MEC Avoidance for Construction Support

Surface MEC Clearance / Soil Sampling Support & Excavation Activities

The EOTI MEC team is prepared to support the field investigation / Soil sampling team during the intrusive activities for the work area and boundaries at the site. During all Soil Sampling Support & Excavation Activities operations, a MEC Technician III/II will be present to visually inspect the operation for MEC and or other hazardous conditions. Identify any OE item if encountered. The visual inspection will be assisted by the use of an Schoenstedt magnetometer or White Medal Detector capable of detecting surface or subsurface ferrous materials.

The team leader will provide daily briefings to the to all on-site contractor/subcontractor personnel on specific MEC procedures employed during the Soil Sampling Support & Excavation Activities.

MEC Identification

Items identified as inert MEC related material will be certified by MEC personnel as inert and segregated at a location designated by AGVIQ safety representative..

Items identified as MEC will be identified and marked by the Technician III. The MEC Technician III will notify AGVIQ safety representative who will in turn notify the closest military installation. .

MEC Removal

EOTI will notify AGVIQ safety representative who in turn will notify the closest military installation.

MEC Disposal

EOTI will notify AGVIQ safety representative who in turn will notify the closest military installation.
2.
2.2.3 Demobilization

Upon completion of the MEC Construction Support, all personnel, material, and equipment will be removed from the site.

2.2.4 MEC Personnel and Qualifications

All UXO Technician team members are experienced and qualified in accordance with DID OE-02501. A UXO Technician III and a UXO Technician II will be on site for each shift.

The UXO Technician III is the technical lead for all MEC operations and is assigned the following safety and health related responsibilities:

- Coordinating schedule and support with the Project Manager
- Overall coordination between operations and safety, and health personnel;
- Reviewing and becoming familiar with this Work Plan and the SSHP;
- Early detection and identification of potential problem areas, including safety and health matters; and
- Conducting and documenting MEC safety briefings for all site personnel and visitors

UXO Technician II within the MEC team is required to comply with the provisions of the SSHP, Work Plan and all applicable Federal, State and local regulations. They report to the UXO Technician III for performing duties as members of functional teams.

2.3 Public Affairs

Employees of EOTI will not publicly disclose any data generated or reviewed on this project. Personnel will refer all requests for information to AGVIQ. It is understood that reports and data generated under this contract are the property of the Department of Defense (DOD) and distribution to any other source, unless authorized by the Contracting Office.

4663 Haygood Rd. Suite #201
Virginia Beach, VA 23455

Phone: (757) 318-9420
Fax : (757)-318-9421

To:	Wayne Lewallen	**From:**	Ellard Janssen
Company:	EOTI	**Date:**	17-Jan-06
Email:	wlewallen@eoti.net	**RE**	UXO/ExOD Services at Site 19 of SJCA, (TO 059) Agviq Project 1303

Message: Request for Quotation (RFQ) **1303-06-001** for Environmental Services under AGVIQ Prime Contract N62470-03-D-4401. CTO-059 (**Site 19 on St. Juliens Creek Annex (SJCA), Chesapeake, Virginia.**)

AGVIQ LLC, CH2M HILL Constructors, Inc. and CH2M HILL, Inc. have formed a joint venture company, **AGVIQ/CH2M HILL Joint Venture I (JVI).** JVI has entered into a prime contract with the U.S. Navy (LANTNAVFACENGCOM), Contract No. N62470-03-D-4401, to provide environmental and remediation services. JVI is either responding to an RFP under this contract or already has an awarded task order which requires the materials or services requested in this solicitation. Suppliers are advised that any one of the Joint Venture companies, or one of their subsidiaries or affiliates may accept an offer in response to this solicitation by issuing a purchase order, or subcontract under their company name for the materials or services priced in your response. Invoices and all correspondence would then be sent to the issuing entity identified in the resulting contract document.

Assumptions which should be included in Bidder's quotation:

- subcontracted services and costs and any other major expenses.

You are invited to submit a Firm, Fixed Price quotation for work under the Government prime contract with the Navy referenced above to provide Services as stated in the attached Scope of Work in support of AGVIQ LLC. Accompanying this RFQ are the following documents:

- Scope of Work (Attachment A);
- Bid Sheet (Attachment B);
- Completed Drug Policy Certification (Attachment C)
- AGVIQ LLC's Terms and Conditions, along with supplemental for field services (Attachment D)
- Navy Flow Down Provisions (Attachment E);
- Contractor Safety Questionnaire (Attachment F)
- Federal Government Project Reps & Certs (Attachment G)

The selected Subcontractor shall supply all equipment, personnel, materials, and services necessary to complete the work outlined in the attached SOW. The Bidder is responsible for reading and understanding all the information contained in the SOW. If the Bidder has

any questions or concerns, it is the Bidder's responsibility to contact AGVIQ for clarification. In addition, if the Bidder believes that AGVIQ has not included all the pertinent information in this SOW or if the Bidder has an alternate method for completing a task, it is the Bidder's responsibility to notify AGVIQ to obtain written approval and documentation of any scope modification prior to implementation of a modified scope.

Your quotation shall include the completed Bid Sheet, all required documents from the SOW, an insurance certificate evidencing your firm's coverages, and a statement that you can meet the required schedule.
You are requested to fax your quotation package to Attn: Mr. Craig Miller to 757-318-9421, or by email to **cmiller@tikigaq.com,** or by regular mail to:

Mr. Craig Miller, AGVIQ, LLC
4663 Haygood Road, Suite 201
Virginia Beach, VA 23455

To arrive no later than 4:00 PM local time on **January 20, 2006**

Other RFQ instructions are as follows:

(1) The selected Subcontractor shall hold or obtain such licenses and permits as required by federal, state, and local statutes.
(2) Bidder's fixed unit rates shall include all appropriate state, local and federal taxes for performance of the work.
(3) The selected Subcontractor shall obtain and maintain current insurance coverage as required by AGVIQ. Should a bidder not have the coverages for insurance in the amounts listed in the Subconsultant Agreement, the bidder shall include as a line item in their quote the additional cost of meeting such coverage amounts.
(4) The selected Subcontractor will be required to execute a subconsultant agreement in accordance with the attached terms. IF YOU TAKE EXCEPTION TO ANY OF THE TERMS AND CONDITIONS, YOU MUST NOTE THE EXCEPTION(S) AND DELINEATE YOUR PROPOSED CHANGE(S) as part of your response to this Request for Quote. If no exceptions are taken, it will be deemed as acceptance of the terms and conditions in the Subcontract.
(5) AGVIQ reserves the right to reject any quotation evaluated as nonconforming, nonresponsive, unbalanced, or conditional to the requirements of this RFQ.
(6) AGVIQ reserves the right to award this subcontract without further discussion.
(7) The anticipated award date of this subcontract is TBD. Award will be based on lowest responsive offer. To be considered responsive, Offeror must confirm ability to meet the Scope of Work in accordance with the attached terms and conditions and ability to meet the schedule provided.
(8) Quotations must remain valid for a minimum of 10 days from time of receipt by AGVIQ. Offerors are required to state the time and date by which a Notice To Proceed is required in order to maintain the offered pricing and complete the schedule on time.
(9) This RFQ does not commit AGVIQ to pay for any costs incurred in the development or submission of quotations, nor does it commit CH2M HILL to procure or subcontract for any services.

Sincerely,

Ellard J Janssen
Subcontract Manager

AGVIQ – CH2M HILL JV I
Prime Contract: N62470-03-D-4401
Task Order 059

Request For Quote 1303-06-001

UXO/ExOD Services

Installation Restoration Program (IRP), Site 19, St. Juliens Creek Annex (SJCA) Chesapeake, VA

AGVIQ/CH2M HILL Joint Venture I Contract, CTO-0059

AGVIQ/CH2M HILL is requesting a bid for UXO/EOD, in conjunction with work being conducted for the Atlantic Division of the Naval Facilities Engineering Command under the AGVIQ-CH2M HILL Joint Venture I contract during the Installation Restoration Program (IRP) at Site 19 at St. Juliens Creek Annex (SJCA) Chesapeake, Virginia.

Activities described below will include the services from a subcontractor to provide UXO/EOD support services for sampling, and soil removal actions in support of Site 19, St. Juliens Creek Annex (SJCA) Chesapeake, Virginia.

Site 19 History

Building 190, (Site 19) was located at the confluence of Blows Creek and the Southern Branch of the Elizabeth River. The building historically handled loose ordnance materials and was used for loading explosives into ammunitions. From the 1940s to the 1970s, Explosive D and Composition A-3 were used at Building 190. In mid-1977, all ordnance-handling buildings were decontaminated by flushing with chemical solutions and water. Prior to decontamination, Naval Ammunition Production Engineering Center (NAPEC) visually inspected the facilities and collected samples for chemical analysis to develop appropriate decontamination procedures for each building. At the conclusion of the decontamination process, NAPEC visually re-inspected each building, collected samples for chemical analysis, and certified that the facilities were decontaminated. However, the level of decontamination was not specified and residues of ordnance remain (NEESA, 1981). Building 190 was demolished sometime after 2000. Since that time, the rail-spur that was associated with the building, located on the Northern side, has also been decommissioned and removed from the Site.

Project Requirements

All field activities described in the SOW will include the services of an Ordnance Explosive (OE)/ Unexploded Ordnance (UXO) subcontractor with qualified personnel to

provide avoidance support during the sampling, and removal action of the contaminated soils. The OE/UXO subcontractor will prepare a Health and Safety Plan (HASP) for OE/UXO construction support that conforms with the Huntsville Corp of Engineers (COE) Interim Guidance Document 0003 "Basic Safety Concepts and Considerations for Ordnance and Explosives Operations/OPNAVINST 8020.14, Department of the Navy Explosive Safety Policy; and NAVSEA OP-05 Volume 1, Ammunition and Explosives Ashore: Safety Regulations for Handling, Storing, Reduction, Renovation, and Shipping. A UXO briefing should be prepared in the event the Navy requires that the subcontractor provide such briefing prior to site entry.

Schoenstadt-assisted surface clearance will be conducted in the areas where the soil samples and soil removal activities are planned, with a Whites Metal Detector for use where the Schoenstadt is ineffective or requires additional confirmation of "hits". The objective of the surface clearance is to identify any Material Potentially Presenting an Explosive Hazard (MPPEH) or other explosive hazards that may exist at the ground surface of the project site thus providing safe access and egress to the project team members as they complete sampling activities, and soil removal activities utilizing heavy equipment.

Schoenstadt-assisted survey will be continuous as soil is excavated. Any subsurface anomalies will be investigated using hand tools, or similar equipment (supplied by selected contractor). UXO Technicians will serve as spotters while the excavations progress to the required dimensions. The rate of excavation will be determined by the type and quantity of anomalies encountered, however the excavation rate is expected to be in 6" to 1' lifts of soil. UXO Technicians will observe the excavated materials and immediately inform the Site Superintendent if MPPEH or MEC is identified. Removal MPPEH from the site will actually be performed by the Navy EOD Unit.

Inspection of all MPPEH will be performed by a qualified UXO contractor or the active-duty military EOD unit. If necessary, following the removal of Munitions Debris (MD), the area will be surveyed again to confirm all suspected anomalies have been investigated and cleared.
If any MEC is encountered, all site activities will be immediately terminated, and an ESS will be submitted and approved prior to the continuance of activities.

Schedule

- A unit price shall be provided by all subcontractors wishing to submit a bid on this project. Price should include the following:

    1. Safety UXO Plan and MEC Construction Support and Management Plan: Delivered 2 weeks after date of subcontract award.

    2. UXO specialist; Crew of 2 people per day (must have a two-man crew at all times during MEC/UXO operations). (One Tech III and One Tech II) Price to include all local travel, per diem, required tools and equipment necessary for performance, back-up equipment if

necessary, administrative support, supervision, and communications. Estimated Quantity. Payment on the basis of number of 10 hour work day performance is required. Project anticipates operating on site for typical 10 hours a day, 5 days a week.

3. All Site personnel require a current 40-hour OSHA training certificate, current OSHA physical with current 8-hour refresher, recent (within 30 days) 10 panel drug screen certificate.

4. Mobilization/demobilization. Price to include all necessary air or ground travel time, equipment and material freight, and any other costs related to a mobilization event. A break in between sampling and excavation is anticipated.

There will be a mobilization to the site for a one-day sampling event, followed by demobilization. This is likely to occur the first week of February 2006. Excavation is expected to start the beginning of March 2006 and last no longer than 2-weeks. This will be cause for a second mobilization and demobilization for this event.

All individuals providing services at SJCA will be required to provide their full names, place of birth, and social security numbers, and citizenship, prior to fieldwork for access onto the Base. Vehicle information, including registration, license plate number and state, state inspection (if required by licensed state), and vehicle owner's information will also need to be provided prior to field work for any vehicle entering the base. Individuals will be required to obtain Base passes. An AGVIQ/CH2M HILL (JVI) employee will coordinate with the base Pass and ID office to arrange base access and will assist all personnel in getting passes.

AGVIQ/CH2M HILL anticipates the sampling event to be performed the first week of February, 2006 and excavation work to begin in March 2006. Field work is not expected to last more than 1-2 weeks. Please reference CTO 0059 with your bid submittal. Bids can be submitted via email to cmiller@tikigaq.com or mailed to:

In care of : (Mr. Craig Miller)
AGVIQ, LLC
4663 Haygood Road, Suite 201
Virginia Beach, VA 23455

All contract questions should be directed to Mr. Ellard "JJ" Janssen via email to ejanssen@tikigaq.com or by phone at (907) 365-6299. Technical questions should be directed to Mr. Craig Miller at (757) 213-8584..

US Army Corps
of Engineers®

EP 385-1-95a

27 August 2004

SAFETY

BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) RESPONSE ACTION OPERATIONS

ENGINEER PAMPHLET

"Approved for public release; distribution is unlimited."

AVAILABILITY

Electronic copies of this and other U.S. Army Corps of Engineers publications are available on the Internet at http://www.hnd.usace.army.mil/techinfo/engpubs.htm. This site is the only repository for all official USACE engineer regulations, circulars, manuals, and other documents originating from HQUSACE. Publications are provided in portable document format (pdf).

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

EP 385-1-95a

CESO

Pamphlet
No. 385-1-95a

27 August 2004

Safety

BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) RESPONSE ACTION OPERATIONS

1. Purpose. This pamphlet establishes U.S. Army Corps of Engineers (USACE) operating procedures for dealing with military munitions at Formerly Used Defense Sites (FUDS), Base Realignment and Closure (BRAC), and Installation Restoration projects. There are no absolutely safe procedures for dealing with military munitions, merely procedures considered to be the least dangerous; therefore, it is essential that a planned and systematic approach to dealing with such items be established.

2. Applicability. This pamphlet applies to all Headquarters, USACE elements and all USACE commands having responsibility for performing munitions response to munitions and explosives of concern (MEC) response action operations.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References. References are at Appendix A.

5. Explanation of Acronyms and Terms. Acronyms and special terms used in this document are explained in the glossary.

6. Policy. The policy of USACE is to produce products and services that fully meet customers' expectations of quality, timeliness, and cost effectiveness, within the bounds of legal responsibility. There will be no compromise of functional, health, or safety requirements. Adherence to the principles outlined in ER 5-1-11 and ER 1110-1-12 will contribute to achieving this goal. Procedures for munitions response to MEC will be formulated to ensure harmony with the USACE Strategic Vision and should be executed in concert with activities presented in other USACE guidance.

7. Responsibilities. Personnel performing munitions response to MEC projects are responsible for safely executing these operations in accordance with the approved Safety Program including the Site Safety and Health Plan, Accident Prevention Plan, approved Work Plan, and all applicable laws, regulations, and policies. A detailed discussion of USACE organizational responsibilities for Military Munitions Response Program (MMRP) projects is presented in ER

This EP supersedes EP 385-1-95a, dated 29 June 2001

1110-1-8153. Safety and health requirements, responsibilities, and procedures for MEC operations are defined in ER 385-1-95 and EM 385-1-1.

8. General Safety Concerns and Procedures.

a. As a general rule, all unexploded ordnance (UXO) and discarded military munitions (DMM) will be detonated in the original position found. This is the safest method to effect final disposition of munitions. Engineering controls may be required based on site-specific conditions. If authorized by the approved Work Plan, UXO and DMM may be moved to a consolidated area for demolition in accordance with EP 1110-1-17.

b. All UXO will be destroyed daily unless circumstances beyond the contractor's control (e.g., unexpected weather storms, unavailability of donor explosives, etc.) preclude their destruction. If a UXO cannot be destroyed on the day of discovery, then the item will be secured and guarded until destruction can be accomplished. Under no circumstances will UXO be left unsecured overnight.

c. MEC operations will not be conducted until all applicable plans for the project in question are prepared and approved. Plans will be approved in accordance with ER 1110-1-8153. These plans will be based upon the concept of limiting exposure to the minimum number of personnel, for the minimum amount of time, to the minimum amount of military munitions consistent with safe and efficient operations.

d. Only UXO-qualified personnel will perform MEC procedures. As an exception, a UXO Technician I may assist in the performance of MEC procedures when under the supervision of a UXO Technician III or higher. Non-UXO-qualified personnel who have been determined to be essential for the operations being performed may be utilized to perform MEC-related procedures when supervised by a UXO Technician III or higher. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III or higher. Contact the Military Munitions Center of Expertise (MM CX) for current UXO Technician ratings.

e. Personnel who will be handling military munitions will not wear outer or inner garments having static-electricity-generating characteristics. Materials made of 100-percent polyester, nylon, silk, and wool are highly static producing. Refer to DA Pam 385-64 for more information regarding non-static-producing clothing.

f. Prior to any action being performed on an ordnance item, all fuzing will be definitively identified if it is possible to safely do so without disturbing the ordnance item This identification

will consist of fuse type by function and condition (armed or unarmed) and the physical state/condition of the fuse, i.e., burned, broken, parts exposed/sheared, etc.

g. MEC operations will be conducted only during daylight hours.

h. In accordance with the requirements of EP 1110-1-18, UXO-qualified personnel involved in performing MEC procedures will be limited to a 40-hour work week, either four 10-hour days or five eight-hour days. Two consecutive work weeks will be separated by 48 hours of rest. A waiver to the 40-hour work week requirement may be granted for conventional munitions response to MEC projects using the following protocols:

(1) The contractor will be required to submit to the Contracting Officer for approval a comprehensive risk assessment for the work that is to be accomplished, taking into account a wide array of factors (e.g., fatigue, health, environment, type of work, etc.). This requirement must be met before an increase in the established 40-hour work week can commence.

(2) For those work schedules exceeding 40 hours, but not exceeding 60 hours, concurrence will be required by the USACE Project Manager, the Ordnance and Explosives Safety Specialist (OESS) supporting the Project Delivery Team, and the Ordnance and Explosives (OE) Safety Manager/Administrator, if assigned. Two (2) consecutive work weeks should be separated by 48 hours of rest.

(3) For proposed work schedules exceeding 60 hours, concurrence will be required by the District Commander and OE Director prior to approval by the Contracting Officer.

9. MEC Procedures Safety Precautions.

a. Every effort will be made to identify a suspect military munition. Under no circumstances will any MEC be moved in an attempt to make a definitive identification. The military munition will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown military munition is encountered, the onsite USACE representative will be notified immediately. If there is no onsite USACE representative, the Military Munitions (MM) Remedial Action District or the U.S. Army Engineering and Support Center, Huntsville (USAESCH) Chief of OE Safety will be notified as soon as possible. If research of documentation is required, it will be initiated by the MM CX. Following is additional guidance for the safe handling of military munitions:

(1) Projectiles containing base-detonating fuses are to be considered armed if the round has been fired.

(2) Arming wires and pop out pins on unarmed fuses should be secured prior to moving military munitions.

(3) Do not depress plungers, turn vanes, or rotate spindles, levers, setting rings, or other external fittings on military munitions. Such actions may arm or activate the items.

(4) Do not attempt to remove any fuse(s) from military munitions. Do not dismantle or strip components from any military munitions.

(5) UXO personnel are not authorized to render inert any military munitions found onsite.

(6) Military munitions will not be taken from the project property as souvenirs/training aids.

(7) Civil War era ordnance will be treated in the same manner as any other military munition.

b. Prior to entering a Munitions Response Area or Munitions Response Site (MRS) that contains Improved Conventional Munitions (ICMs) or submunitions, a Department of the Army (DA) waiver will be obtained by the affected installation or the executing MM Remedial Action District for FUDS properties. The waiver will be obtained in accordance with the requirements listed in DA Pam 385-64. The waiver will be routed through the MM CX for concurrence. If an ICM or submunition is found at a project property not previously known to contain ICMs or submunitions, work will cease. If the item is found as a result of a munitions response to MEC project, then the team that discovered the item will perform the disposal. If the item is found as a result of some other activity (e.g., construction support), then the notification and disposal procedures identified in the approved Work Plan will be used to dispose of the item. The discovered item will be identified, then properly disposed of (including guarding the item if disposition is to be delayed). Work will resume only when an ICM waiver has been obtained. For guidance on the preparation of waiver requests, contact the MM CX.

c. Any time munitions with unknown fillers are encountered during conventional munitions response to MEC project activities, all work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area in accordance with the provisions identified in the approved Work Plan to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area. Personnel who could have been exposed to the unknown filler will not be released from the site until the presence of contamination has been verified by the U.S. Army Technical Escort Unit (TEU).

(1) On FUDS properties, the UXO team will notify the local Point of Contact (POC) designated in the Work Plan. The local POC will facilitate the Explosive Ordnance Disposal

(EOD) response, and two personnel will secure the location until the EOD unit's arrival. If the local POC designated in the Work Plan is not the local law enforcement agency, then the local POC will inform the local law enforcement agency of the discovery if necessary. The EOD unit will notify the TEU and secure the area until TEU's arrival. After notifying the local law enforcement agency (when necessary), the executing MM Remedial Action District will notify their safety group and the MM CX of the actions taken. Refer to EP 75-1-3 for more detailed instructions on the procedures to take in the event munitions with unknown fillers are encountered on FUDS properties.

(2) Do not have munitions with unknown fillers exposed to direct sunlight after it has been excavated. Some fillers can detonate with the temperature change.

(3) On active or BRAC installations, the UXO team will notify the POC designated in the Work Plan.

d. Avoid inhalation and skin contact with smoke, fumes, and vapors of explosives and related hazardous materials.

e. UXO are the most dangerous military munitions that may be encountered. All military munitions, regardless of their appearance or condition, will be considered dangerous and managed as UXO until assessed otherwise by an UXO-qualified individual. Military munitions that have experienced abnormal environments, such as demilitarization by open burning, open detonation, accidents, fires or where components have been armed or affected by certain tests (e.g., fuse arming tests, jolt and jumble tests), are very unstable.

f. Do not rely on the color coding of military munitions for definitive identification. Military munitions having incomplete or improper color codes have been encountered.

g. Avoid approaching the forward area of a military munition until it can be determined whether or not the item contains a shaped charge. The explosive jet, which is formed during detonation, can be lethal at great distances. Assume that all shaped-charge munitions contain a piezoelectric (PZ) fuzing system until investigation proves otherwise. PZ fuzing systems are extremely sensitive, can function at the slightest physical change, and can remain hazardous for an indefinite period of time. In some cases, merely casting a shadow across a PZ fuse can cause it to detonate.

h. Approach an unfired rocket motor at a 45-degree angle from the rear. Accidental ignition can cause a missile hazard and hot exhaust.

i. Do not expose unfired rocket motors to any electromagnetic radiation (EMR) sources. See DA Pam 385-64 for safe separation distances from various sources of EMR.

j. Consider an emplaced landmine to be armed until proven otherwise. It may be intentionally booby trapped. Many training mines contain spotting charges capable of inflicting serious injury.

k. Assume that a practice military munition contains a live charge until investigation proves otherwise. Expended pyrotechnic and practice devices can contain red or white phosphorus (WP) residue. Due to incomplete combustion, this residue may re-ignite spontaneously if the crust is broken and exposed to air.

l. Do not approach a smoking WP munition. Burning WP may detonate the explosive burster charge at any time.

m. Foreign ordnance was shipped to the United States for exploitation and subsequent disposal. Every effort will be made to research all applicable documentation prior to commencement of a project involving foreign ordnance.

10. Military Munitions and Commercial Explosives Storage.

a. On Department of Defense (DOD) installations, DOD 6055.9-STD and Service requirements (Army – AR 385-64; Navy – NAVSEA OP 5; Air Force – AFM 91-201) will be met. For the remainder of this pamphlet, reference to DOD standards (i.e., DOD 6055.9-STD) also implies that Service explosives safety publications will be adhered to. Generally, the contractor may be able to use an existing explosives storage facility on an installation that meets DOD standards. If not, the contractor will establish a temporary storage facility. The compatibility of explosives defined in DOD 6055.9-STD, will be followed. Recovered munitions awaiting final disposition will not be stored with serviceable explosives. Commercial explosives will be assigned a DOD hazard classification (e.g.., 1.1, 1.2, etc.) and storage compatibility grouping by the U.S. Army Technical Center for Explosives Safety prior to being stored on a military installation. Contact the MM CX for a current listing of commercial explosives that have been assigned a DOD hazard classification.

b. Off DOD installations, the contractor will be responsible for establishing a temporary explosives storage area. This temporary explosives storage area will meet local, state, 27 CFR 55, 29 CFR 1910.1201, and DOD 6055.9-STD requirements to the greatest extent practicable.

c. Temporary Explosives Storage Area.

(1) It is required that each contractor establish a temporary explosive storage area for each project when explosives will be stored for the purpose of disposing of military munitions onsite. Recovered military munitions may have to be stored onsite depending on the final disposal method selected.

(2) Magazines must meet the requirements of 27 CFR 55 and each magazine must have a Net Explosive Weight (NEW) and hazard classification established for the explosives to be stored. The NEW is calculated in accordance with the procedures identified in DA Pam 385-64.

(3) EM 1110-1-4009 provides the criteria for establishing temporary storage areas using Bureau of Alcohol, Tobacco, and Firearms (ATF), Type II Magazines.

(4) When a project is being conducted on an installation, the installation has an approved storage facility, and permission to store the demolition explosives in an approved storage facility is obtained from the installation and/or Major Army Command (MACOM), as applicable, the explosives will be stored in accordance with the approved procedures used by the installation. Otherwise, the contractor will establish a temporary storage area using ATF, Type II magazines. Installations require MACOM approval for storage of commercial explosives. Contact the MM CX for procedures to be used to obtain MACOM approval.

(5) A log of the stored material will be maintained at the storage facility and at the project administrative office.

d. Temporary Explosives Storage Area Explosives Siting Requirements.

(1) EM 1110-1-4009 provides guidance for siting an explosives storage magazine.

(2) Compliance with 29 CFR 1910.1201 and DOD 6055.9-STD is required.

(a) The following facilities will be located at the Inhabited Building Distance (IBD) from the storage magazines. For any magazine (ATF Type II, Earth Covered, Aboveground, etc.) use the standards identified in DOD 6055.9-STD (Revision 3).

- Office facilities occupied by administrative support personnel.
- Quantity-Distance (Q-D) from Explosive Storage Magazines to Scrap Vendor Pickup Points. Scrap pickup points will be positioned as far as possible from project magazines, consistent with operational needs. At a minimum, the scrap pickup point will be sited at the Public Traffic Route (PTR) from the magazines.
- The distances identified in DOD 6055.9-STD apply to all inhabited buildings.

(b) There is no Minimum Separation Distance (MSD) required from the explosives storage area to a MEC work area where MEC procedures are ongoing. The explosives storage area will be sited at a MSD of one hazardous fragment per 600 square feet based on the Munition with the Greatest Fragmentation Distance (MGFD) from the MEC work area boundary.

(c) Siting of Magazines to PTRs. The type of distance (IBD, PTR, etc.) required to a PTR depends on the traffic density. The criteria, defined in DOD 6055.9-STD include:

- For PTRs, the minimum fragment and debris distance for Hazard Division 1.1 ammunition and explosives will be based on the traffic density considered at three levels: high traffic density, medium traffic density, and low traffic density. The traffic density will be averaged over a normal (non-holiday) week in terms of the number of passengers during a 24-hour period.

- High Traffic Density. If routes have 10,000 or more car and/or rail passengers per day, or 2,000 or more ship passengers per day, then the IBD criteria apply.

- Medium Traffic Density. If routes have 400 or more, but less than 10,000 or more car and/or rail passengers per day, or 80 or more, but less than 2,000 ship passengers per day, then 60 percent of the specified minimum fragment distance for the IBD applies.

- Low Traffic Density. If routes have less than 400 cars and/or rail passengers per day, or less than 80 ship passengers per day, then no minimum fragment distance is required. Minimum distance will be based on the blast criteria (K24/K30) only.

(3) In cases where the facility cannot meet the intermagazine, IBD, and PTR Q-D requirements specified in DA Pam 385-64 and DOD 6055.9-STD, a barricading plan or other engineering controls to protect the public from accidental detonation will be submitted to the MM CX for approval.

(4) Material Potentially Presenting an Explosive Hazard (MPPEH) Processing Areas. For MPPEH that has been inspected in the MEC work area and brought to a processing area for metals segregation, certification, verification, containerization, etc., apply the intraline distance from the storage magazines to the scrap processing area, based on the quantity of explosives at the magazine. See the appropriate tables in DOD 6055.9-STD.

(5) Siting Magazines at Operational Installations.

(a) On-Post Roads. For magazines supporting munitions response to MEC work at operational installations, on-post roads are normally not considered PTRs and no Q-D applies from the magazine to them. Exceptions are as follows:

- On-post roads open to the public are PTRs.

- On-post roads that are closed to the public, but are used by installation personnel who are unrelated to the installation's ammunition mission are considered PTRs.

(b) Installation Personnel and Operations.

- Installation ammunition personnel and operations. Site the magazine at the intraline distance to these exposures (note: magazine distance applies from installation explosives locations to magazines supporting munitions response to MEC projects).

- Installation non-ammunition personnel and operations. Site the magazine at the IBD to these exposures.

e. Lightning Protection for Explosives Storage Areas.

(1) Each magazine will be provided lightning protection in accordance with DA Pam 385-64. The provisions of the National Fire Protection Association (NFPA) 780, which are consistent with Army guidance, may be used to supplement Army guidance where necessary.

(2) DOD 6055.9-STD requires functional lightning protection for all explosives storage areas.

(3) Approved explosives storage areas on active installations will have a Lightning Protection System (LPS) installed.

(4) Temporary explosives storage areas used to support an on-going project will have a LPS. Existing earth-covered magazines at a FUDS project property will have a LPS.

(5) Prior to storing explosives in any magazine with an installed LPS, the system will be inspected and tested to ensure it is functional. Existing facilities without a LPS will have a LPS installed and tested to ensure it is functional prior to storing explosives. Inspection and testing criteria are contained in DA Pam 385-64.

(6) NFPA 780 allows the metal walls of the magazine to act as both the air terminal and down conductor of a LPS, provided the portable magazine meets the following criteria: magazines manufactured entirely from metal that are at least 3/16 inches thick and that have doors bonded to the side of the magazine. ATF-approved, portable Type II magazines meet these criteria. Lightning protection is completed by grounding the magazine in accordance with EM 1110-1-4009; however, the grounding system will be inspected and tested in accordance with DA Pam 385-64. The Interim Holding Facilities (IHF) used for Recovered Chemical Warfare Materiel (RCWM) projects do not meet these criteria; therefore, they will have a LPS designed, installed, and tested prior to use, if the IHF is to be sited for explosively-configured RCWM. If the IHF is not sited for explosively-configured items, a LPS is not required.

(7) When more than one portable magazine is used on a project property, they will be separated by a minimum of 2 meters (6.5 feet) if they are grounded separately, or they will be bonded to a common grounding system if the 2 meter (6.5 foot) criteria cannot be met. Fences installed around magazines will be at least 2 meters (6.5 feet) from the magazine or bonded into the grounding system.

f. Munitions Debris Storage Inside the Fenced Explosives Storage Area. Certified, verified, containerized munitions debris may be stored in the fenced explosives storage area. However, the munitions debris containers will be made of non-flammable materials. Wood or cardboard containers are not acceptable as they constitute a fuel source in case of fire near the magazine.

g. Fire Protection.

(1) A fire plan for either an on-installation or off-installation explosives storage facility will be prepared and coordinated with the local fire department.

(2) Clear all combustible material a minimum of 15.25 meters (50 feet) around portable magazines. Do not store any combustible materials within 15.25 meters (50 feet) of any magazine.

(3) Placarding.

(a) On DOD Installations. Affix a fire symbol to the magazine in accordance with DA Pam 385-64.

(b) FUDS and Other Munitions Response to MEC Projects Not on DOD Operational Installations. Placarding of magazines will be performed in accordance with local rules and regulations.

(c) Routine emergency response drills will be conducted in accordance with the approved Work Plan to familiarize the response personnel with the hazards.

h. Physical Security. A physical security survey will be conducted in accordance with AR 190-11 to determine if fencing or guards are required. For BRAC or active installations the physical security survey will be coordinated through the Provost Marshall's office. For FUDS, this survey will be coordinated with local law enforcement agencies. See EP 1110-1-18 for additional details on physical security.

(1) Generally, a fence around the magazine is not needed, in accordance with 27 CFR 55. However, the degree of protection needed to prevent the theft of the military munitions will be provided.

(2) USACE contractors must be aware of 49 CFR 172, Subparts H and I concerning the offering, preparing, or transporting of designated hazardous materials, as well as the necessary security requirements.

i. Magazines for Storage of RCWM. Refer to EP 75-1-3 and EP 1110-1-18 for RCWM IHF siting requirements.

j. Requirements for the physical security of a RCWM IHF are contained in EP 75-1-3.

11. Military Munitions Transportation, Offsite. In the event that military munitions will be transported offsite, the provisions of EP 1110-1-18 will be followed. In addition, USACE contractors are prohibited from transporting UXO offsite for destruction until the provisions of Technical Bulletin 700-2 have been met.

12. Military Munitions Transportation, Onsite. The following safety procedures will be followed for the transportation of military munitions that are acceptable to be moved/transported onsite:

a. Do not transport WP munitions unless they are immersed in water, mud, or wet sand.

b. If loose pyrotechnic, tracer, flare, or similar mixtures are to be transported, they will be placed in Number 10 mineral oil or equivalent to minimize the fire and explosion hazards.

c. Incendiary-loaded munitions will be placed on a bed of sand and covered with sand to help control the burn if a fire should start.

d. If an unfired rocket motor will be transported, it will be positioned in the vehicle parallel to the rear axle and secured in place with sandbags. This will afford maximum protection for the personnel operating the vehicle.

e. If a base-ejection projectile will be transported to a disposal facility, the longitudinal axis of the projectile will be oriented parallel to the rear axle and secured in place with sandbags. This will afford maximum protection for the personnel operating the vehicle.

f. Military munitions with exposed hazardous fillers, such as High Explosive, will be placed in appropriate containers with packing material to prevent migration of the hazardous fillers. Padding will be added to protect the exposed filler from heat, shock, and friction.

13. Exclusion Zone Operations. On munitions response to MEC projects, it is the responsibility of the contractor's Unexploded Ordnance Safety Officer (UXOSO) to establish the exclusion zone (EZ) for each MRS.

a. The purpose of the EZ is to protect nonessential personnel from blast overpressure and fragmentation hazards. Calculating EZs with respect to intentional and unintentional detonations is discussed below. Approved engineering controls may be used to reduce the EZ for either intentional or unintentional detonations.

(1) Intentional Detonations. The minimum separation distances specified in DOD 6055.9-STD will be used unless lesser distances have been calculated using TP Number 16.

(2) Unintentional Detonations. If the identity of the military munitions to be found is unknown, the minimum separation distance specified in DOD 6055.9-STD will be used to establish the EZ. If the identity of the military munitions to be found is known, use TP Number 16 to determine the criteria for establishing the EZ.

b. When multiple teams are working onsite, a Team Separation Distance (TSD) will be established. The minimum TSD will be the greater of 61 meters (200 feet), the hazardous fragment distance of the MGFD (lesser distance authorized if supported by a hazard assessment), or the K50 (0.9 pounds per square inch) overpressure distance.

c. While MEC procedures are being conducted, only personnel essential for the operation and authorized visitors will be allowed to enter a MRS EZ. When nonessential personnel enter the EZ, all MEC procedures will cease. In addition to this work stoppage, the following actions will be taken:

(1) The individual(s) will receive a safety briefing and sign the visitors log prior to entering the EZ.

(2) The individual(s) will be escorted by a UXO-qualified individual.

d. All personnel working within the EZ will comply with the following:

(1) There will be no smoking within the EZ, except in areas designated by the UXOSO.

(2) There will be no open fires for heating or cooking (gas stoves, grills, etc.) within the EZ, except where authorized by the UXOSO. If open fires for heating or cooking are to be allowed on the project property, then the appropriate fire fighting measures and plans need to be established in the approved Work Plan.

(3) During geophysical detection operations, personnel will not wear any metal (e.g., rings, watches, keys, etc.) that would interfere with the instrument's operation.

e. On RCWM project properties, EZs will be established in accordance with EP 75-1-3.

14. Authorized Visitors.

a. Explosives Safety Policy.

(1) In accordance with DOD 6055.9-STD and DA Pam 385-64, it is DOD and DA policy to limit the exposure to a minimum number of persons, for a minimum time, to the minimum amount of ammunition and explosives (i.e., MEC) consistent with safe and efficient operations.

(2) DA Pam 385-64 provides the following discussion concerning personnel limits:

(a) Tasks not necessary to the operation will be prohibited within the immediate area of the hazard produced by the operation. (For USACE MMRP projects, multi-discipline and multiple MEC project teams performing tasks required to execute the project may be in the EZ while MEC procedures are being performed as long as minimum team separation distances are maintained.)

(b) Personnel limits, to include authorized visitors, will be clearly posted for each operation and must not be exceeded during the operation. (For USACE MMRP projects, personnel limits are based on the approved Work Plan designating the number and types of teams that may be required to complete the field operations.)

(c) Personnel not needed for the operation will be prohibited from visiting. (For USACE MMRP projects, essential personnel and authorized visitors, as defined in this guidance, may visit the EZ while MEC procedures are being conducted.)

(3) DA Pam 385-64 and ER 385-1-95 require the contractor to establish an EZ around each work area where MEC procedures are being performed. The EZ is established to protect non-essential personnel from the damaging effects of blast overpressure and fragmentation should an unintentional detonation occur. The EZ will be delineated in the approved Work Plan, Explosives Siting Plan, and Explosives Safety Submission.

b. Responsibilities.

(1) Authorized visitors will obtain written approval from the executing district's Safety and Occupational Health Office (SOHO).

(2) Project team members listed in the Quality Assurance Surveillance Plan (QASP) do not require additional SOHO approval. They will be considered as authorized visitors when performing assigned quality assurance functions. If a QASP is not available, or personnel are not listed in the QASP, SOHO approval is required.

(3) The contractor is responsible for considering all explosives safety policies and principles when making determinations regarding EZ operations and personnel limits.

(4) The contractor is responsible for posting personnel limits and ensuring all personnel are aware of and comply with the posted limits.

(5) All personnel entering, or working in, EZs are responsible for ensuring personnel limits are not exceeded.

c. Requirements and Procedures.

(1) All requests for approval as an authorized visitor for entry into the EZ during MEC procedures will be submitted through the Project Manager (PM). The PM will provide the request to the project OE safety Specialist for review prior to transmitting it to the executing district's SOHO for approval. An exception to this is provided in paragraph 14.b.(2) above. All visitor authorization requests will:

(a) Describe the purpose of the visit and the tasks to be performed.

(b) Explain why the tasks must be performed during MEC procedures.

(c) Specify whether the visit will be a single visit or one in a series of visits.

(d) State the frequency of the visits and the time required to perform the task.

(2) The on-site UXOSO will ensure:

(a) The documentation approving the authorized visitors is reviewed for adequacy based on this guidance and the tasks to be performed. This documentation will become part of the project file.

(b) Non-essential personnel, which include unauthorized visitors, are prohibited within the EZ where MEC procedures are being performed.

(c) All authorized visitors are provided a safety briefing prior to entering the EZ and a UXO-qualified escort regardless of their qualifications.

(d) Posted personnel limits are not exceeded while MEC procedures are being conducted. If more than the posted number of personnel are in the EZ while MEC procedures are being performed, MEC procedures must cease and the required number of personnel must leave before they may continue.

(e) Personnel limits are posted at or near the contractor's on-site office. As a minimum, the limits should be posted at a central site accessible to all personnel.

(f) Personnel limits are a topic covered during the contractor's daily safety briefings.

(3) Once the personnel limits are established, the contractor has the flexibility to manage team sizes to accomplish the mission provided the personnel limits are not exceeded.

15. Munitions Response Excavation Operations.

a. By their nature, MEC procedures/anomaly excavations are hazardous and certain calculated risks will be taken. Ingenuity, judgment, common sense, and above all, the mastery of EOD techniques and observance of EOD principles will determine success or failure. UXO-qualified technicians will be alert at all times and be in observance of EOD safety precautions. EOD/UXO-qualified personnel are the most experienced and best qualified to perform these operations.

b. Hand excavation is the most reliable method for uncovering a military munition. However, hand excavation exposes personnel to the hazard of detonation. Only EOD or UXO-qualified personnel are to perform these operations.

c. Specific Procedures for Anomaly Excavation.

(1) Start all excavations from the side of the anomaly. Carefully dig from the side until identification of the anomaly is made. Excavation operations, whether by hand or Earth-Moving Machinery (EMM), will employ a step-down or offset access method. Under no circumstances will any excavation be made directly over suspected military munitions.

(2) Clear debris/dirt from the subsurface anomaly only enough to permit identification of the anomaly and to apply the necessary MEC procedure.

(3) All UXO will be blown in place, when possible.

(4) Move with slow, deliberate motions; avoid abrupt moves.

(5) Avoid impacting, jarring, or striking UXO.

(6) Do not subject UXO to shock, rough handling, heat, or any other force.

(7) Observe EMR precautions in accordance with DA Pam 385-64.

d. EMM may be used to excavate overburden from suspected military munitions. EMM will not be used to excavate within 12 inches of a suspected military munition. Once the EMM is within 12 inches of the suspected military munition, the excavation will be completed by hand excavation methods. Personnel who are not UXO-qualified may operate EMM only when supervised by a UXO Technician III or higher.

(1) If more than one earth-moving machine is to be used onsite, the same minimum separation distances required for multiple work teams apply.

(2) EMM operations will be conducted within the guidelines of EM 385-1-1 and 29 CFR 1926, subpart P.

16. Procedures for Assessing Munitions with Unknown Fillers.

a. Background.

(1) For explosives and chemical safety reasons, the complete identification of recovered munitions is required before destruction or disposal. This is particularly true with regard to munitions that can be filled with chemical warfare materiel (CWM) and could present a downwind chemical vapor hazard.

(2) Many munitions have sufficient physical properties (e.g., design characteristics, markings) that allow USACE OESS and UXO personnel to positively identify the munition and the filler. However, the design or physical condition of some munitions may not allow their complete identification by visual inspection.

(3) Munitions whose external design does not always allow for positive identification of their filler include: 4.2-inch mortars (M1, M2, and the M2A1 models) and Livens projectiles (MK II (M1) and MKIIAI).

(a) Because the 4-inch Stokes mortar's physical dimensions (see Appendix B) clearly indicate whether or not it contains a suspect chemical filler, it is not included in this list.

(b) Because this list is not all inclusive, the MM CX should be contacted about other munitions when questions arise.

(4) The identification of the filler of some munitions is very difficult, if not impossible, through visual inspection when the munition has been used or otherwise impacted (e.g., disposed

of after ineffective treatment) or exposed to the environment (e.g., buried as a means of disposal) for years.

(5) Only EOD or TEU will be allowed to determine the most likely filler of these munitions.

b. Procedures. When performing munitions responses on USACE project properties and the filler of a munition listed above cannot be determined, the following procedures will be followed. Refer to EP 75-1-2 for additional details on procedures to be followed in the event that munitions with unknown fillers are identified on conventional munitions response to MEC project properties.

(1) On conventional munitions response to MEC project properties, contact the POC identified in the approved Work Plan for performing the assessment or response (i.e., military EOD or TEU). Typically, the Work Plan will address how to "safe the hole / item" to mitigate the possible downwind hazards pending the arrival of the appropriate response personnel.

(2) On RCWM projects, TEU will normally be present at the project property and will perform the assessment as part of their daily routine and per their procedures.

(3) If the assessment has ruled out RCWM as a filler, then the item will be returned to USACE for disposal operations as specified in the approved conventional munitions response to MEC Work Plan.

(4) If the assessment indicates RCWM as a filler:

(a) On a RCWM project, TEU will package and secure the item per the approved Chemical Safety Submission, usually on site.

(b) On a conventional munitions response to MEC project, TEU will assume control of the item. (Note: TEU may require some logistical support during the assessment process.)

(5) The use of these procedures is a precautionary measure to confirm that the munition can be safely destroyed; to help ensure that an uncontrolled, unintentional release of CWM does not occur; and to validate site-specific information.

c. It is important that terminology used not cause unnecessary public or regulatory concern. Generally, these munitions should be referred to as munitions with unknown fillers, rather than suspect chemical munitions.

17. Military Munitions Disposal Operations. All disposal operations will be conducted in accordance with TM 60A-1-1-31, EP 1110-1-17, and the unnumbered USAESCH publication

entitled Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites.

a. As a general rule, all disposal operations will be accomplished by electrical means to ensure maximum safety. There are exceptions to this requirement in situations where static electricity or EMR hazards are present. Unintentional detonations can occur because of these induced currents (or lightning). The following precautions from DA Pam 385-64 are to be followed:

(1) Premature detonation of electric blasting caps by induced current from radio frequency signals is possible. Refer to DA Pam 385-64 for minimum safe distance with respect to transmitter power and indication of distance beyond which it is safe to conduct electric blasting even under the most adverse conditions.

(2) Lightning is a hazard with respect to all field activities. Lightning strikes, even at distant locations, may cause extremely high local earth currents. Effects of remote lightning strikes are multiplied by their proximity to conducting elements such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduits. The only safe procedure is to suspend all field activities when an electrical storm approaches to within 5 miles of the project location.

(3) Electric power lines also pose a hazard with respect to electric initiating systems. It is recommended that any disposal operation closer than 155 meters (517 feet) to electric power lines be done with a non-electric system.

b. The only acceptable disposal method is the one stated in the appropriate TM 60 Series manual for specific ordnance types. Any commercial explosives being used will be equivalent to the military explosive required for the disposal operation.

c. If justified by the situation, protective measures to reduce shock, blast overpressure, and fragmentation will be taken. The MM CX will assist in any design work and will review for approval all proposed protective measures.

d. MSDs for personnel during MEC disposal operations will be in accordance with DOD 6055.9-STD, TP 16, or the distance provided by the MM CX.

e. During open detonation operations, personnel will be located away from lifting lugs, strong backs, base plates, etc..

f. Once disposal operations are completed, a thorough search of the immediate area will be conducted with a magnetometer to ensure that a complete disposal was accomplished.

f. Once disposal operations are completed, a thorough search of the immediate area will be conducted with a magnetometer to ensure that a complete disposal was accomplished.

g. Inert ordnance will not be disposed of as scrap until the internal fillers/voids have been exposed and unconfined.

FOR THE COMMANDER:

JOHN R. McMAHON
Colonel, Corps of Engineers
Chief of Staff

2 Appendices
Appendix A - References
Appendix B – 4-inch Stokes Mortar Measurements

APPENDIX A
References

27 CFR 55, Commerce in Explosives.

29 CFR 1910.1201, Retention of DOT Markings, Placards, and Labels.

29 CFR 1926, Subpart P, Excavations.

49 CFR 172, Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.

DOD 6055.9-STD
Department of Defense Ammunition and Explosives Safety Standards, Latest Revision.

DODD 4715.11
Environmental and Explosive Safety Management on Operational Ranges Within the United States.

Department of Defense Explosives Safety Board Technical Paper No. 16
Methodologies for Calculating Primary Fragment Characteristics.

Technical Bulletin 700-2
Department of Defense Ammunition and Explosives Hazard Classification Procedures.

AR 190-11
Physical Security of Arms, Ammunition, and Explosives.

AR 385-64
U.S. Army Explosives Safety Program.

DA Pam 385-64
Ammunition and Explosives Safety Standards.

FM 3-09.21
Tactics, Techniques and Procedures for the Field Artillery Battalion.

TM 60A-1-1-31
Explosive Ordnance Disposal Procedures: General Information on Explosive Ordnance Disposal Procedures.

EP 385-1-95a
27 Aug 04

ER 5-1-11
Program and Project Management.

ER 385-1-95
Safety and Health Requirements for Ordnance and Explosives (OE) Operations.

ER 1110-1-12
Quality Management.

ER 1110-1-8153
Ordnance and Explosives Response

EP 75-1-2
Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities.

EP 75-1-3
Recovered Chemical Warfare Materiel (RCWM) Response.

EP 1110-1-17
Establishing a Temporary Open Burn and Open Detonation Site for Conventional Ordnance and Explosives Projects.

EP 1110-1-18
Ordnance and Explosives Response.

EM 385-1-1
Safety and Health Requirements Manual.

EM 1110-1-4009
Ordnance and Explosives Response

U.S. Army Engineer and Support Center, Huntsville Document
Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites, U.S. Army Engineering and Support Center, Huntsville, Terminology Update March 2000. This document is available on the Internet at http://www.hnd.usace.army.mil/oew/proceddocs.asp.

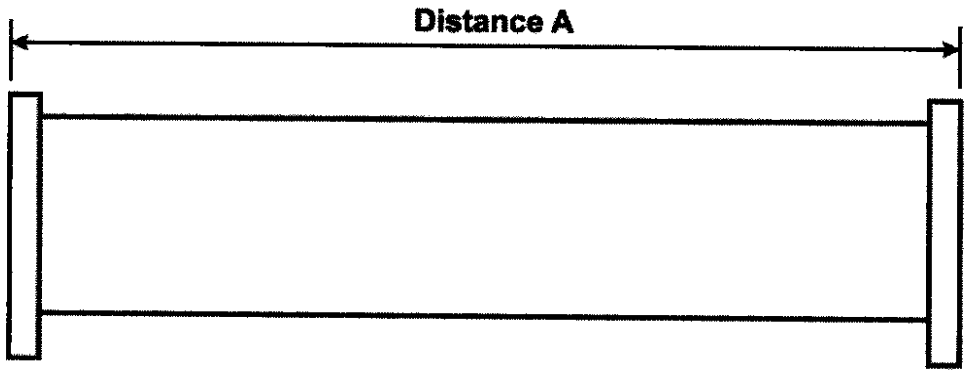
AFM 91-201
Explosives Safety Standards.

NAVSEA OP 5
Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation, and Shipping.

NFPA 780
Standard for the Installation of Lightning Protection Systems.

APPENDIX B
4-Inch Stokes Mortar Round Measurements

Distance A is measured from outside of the windage ring to outside of the windage ring without regard to fuze mounting location or tail boom.



Distance A measurement for the following type of mortar fillers are:

Chemical Gas - MK I = 16 inches, MK III = 16 3/4 inches
Smoke Filled - MK I = 15 inches
Incendiary Filled - MK I = 14 inches

GLOSSARY

Section I
Acronyms

AFM.....Air Force Manual
AR.....Army Regulation
ATF.....Bureau of Alcohol, Tobacco, and Firearms
BRAC.....Base Realignment and Closure
CFR.....Code of Federal Regulations
CWM.....Chemical Warfare Materiel
DA.....Department of the Army
DA Pam.....Department of the Army Pamphlet
DMM.....Discarded Military Munition
DOD.....Department of Defense
EM.....Engineer Manual
EMM.....Earth-Moving Machinery
EMR.....Electromagnetic Radiation
EOD.....Explosive Ordnance Disposal
EP.....Engineer Pamphlet
ER.....Engineer Regulation
EZ.....Exclusion Zone
FUDS.....Formerly Used Defense Sites
HTRW.....Hazardous, Toxic, and Radioactive Waste
IBD.....Inhabited Building Distance
ICM.....Improved Conventional Munition
IHF.....Interim Holding Facility
LPS.....Lightning Protection System
MACOM.....Major Army Command
MC.....Munitions Constituents
MEC.....Munitions and Explosives of Concern

MGFD ..... Munition with Greatest Fragmentation Distance
MM ..... Military Munitions
MM CX ..... Military Munitions Center of Expertise
MMRP ..... Military Munitions Response Program
MPPEH ..... Material Potentially Presenting an Explosive Hazard
MRA ..... Munitions Response Area
MRS ..... Munitions Response Site
MSD ..... Minimum Separation Distance
NAVSEA OP ..... Naval Sea Systems Command Ordnance Pamphlet
NEW ..... Net Explosive Weight
NFPA ..... National Fire Protection Association
OE ..... Ordnance and Explosives
OESS ..... OE Safety Specialist
pdf ..... Portable Document Format
POC ..... Point of Contact
PTR ..... Public Traffic Route
PZ ..... Piezoelectric
Q-D ..... Quantity-Distance
QAR ..... Quality Assurance Representative
QASP ..... Quality Assurance Surveillance Plan
RCWM ..... Recovered Chemical Warfare Materiel
SOHO ..... Safety and Occupational Health Office
STD ..... Standard
TEU ..... U.S. Army Technical Escort Unit
TM ..... Technical Manual
TP ..... Technical Paper
TSD ..... Team Separation Distance
USACE ..... U.S. Army Corps of Engineers
USAESCH ..... U.S. Army Engineering and Support Center, Huntsville
UXO ..... Unexploded Ordnance
UXOSO ..... Unexploded Ordnance Safety Officer
WP ..... White Phosphorus

Section II
Terms

Authorized Visitors
DOD, DA, USACE, or other personnel (MM CX, Department of Defense Explosives Safety Board , HQ Safety, etc.) conducting project or mission related functions, e.g., Quality Assurance Representatives (QARs), safety and quality inspectors (including geophysicists performing quality assurance functions), and project management. Authorized visitors must be escorted while in the EZ and be approved for entry into the EZ in accordance with this guidance. No more than 2 authorized visitors will be permitted in the EZ at any given time.

Defense Sites
Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions. (10 U.S.C. 2710(e)(1))

Discarded Military Munitions (DMM)
Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Essential Personnel
USACE and contractor project personnel necessary for the safe and efficient completion of field operations conducted in an EZ. This is limited to: contractor work team members including the Unexploded Ordnance (UXO) Safety Officer (UXOSO), UXO Quality Control Specialist, Senior UXO Supervisor, and a USACE Ordnance and Explosives (OE) Safety Specialist.

Exclusion Zone (EZ)
A safety zone established around a MEC work area where MEC procedures are being conducted.

Improved Conventional Munition (ICM)
ICMs are delivered by 105 and 155 Howitzers and the Multiple Launch Rocket System (rockets and missiles). There are three types of ICM: 1) Antipersonnel (APICM); 2) Antipersonnel, Antimaterial (APAM); and 3) Dual Purpose (DPICM). (FM 3-09.21)

Material Potentially Presenting an Explosive Hazard (MPPEH)
Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or

disposal; and range-related debris); or material potentially contaminated with a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, ventilation ducts) associated with munitions production, demilitarization or disposal operations. Excluded from MPPEH are munitions within DOD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

MEC Procedures
Procedures which include, but are not limited to, the following actions performed by a UXO-qualified individual:

a. Gaining access to (manual excavation) and identifying subsurface anomalies and assessing the condition of buried MEC.

b. Identifying and assessing the condition of surface MEC.

c. Recovering and making final disposal of all MEC.

MEC-Related Procedures
Procedures which include, but are not limited to, the following actions which may be performed by a non-UXO-qualified individual:

a. Locating and marking subsurface anomalies.

b. Locating and marking suspected surface MEC.

c. Transporting and storing recovered MEC.

d. Utilizing EMM to excavate overburden from suspected MEC.

Military Munitions
Military munitions means all ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof.

The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101(e)(4)).

Munitions Constituents (MC)
Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.
(10 U.S.C. 2710(e)(4)).

Munitions and Explosives of Concern (MEC)
This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means:

a. Unexploded Ordnance (UXO), as defined in 10 U.S.C. 2710(e)(9);

b. Discarded Military Munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or

c. Munitions Constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.

Munitions Response
Response actions, including investigation, removal and remedial actions to address the explosives safety, human health, or environmental risks presented by unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC).

Munitions Response Area (MRA)
Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites.

Munitions Response Site (MRS)
A discrete location within a MRA that is known to require a munitions response.

Personnel Limits
The maximum number of personnel that may be in the EZ at any one time. This includes essential personnel as defined above, plus 2 authorized visitors.

Submunition
Any munition that, to perform its task, separates from a parent munition. (DODD 4715.11)

Unexploded Ordnance (UXO)
Military munitions that:

a. Have been primed, fused, armed, or otherwise prepared for action;

b. Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and

c. Remain unexploded either by malfunction, design, or any other cause.
(10 U.S.C. 101(e)(5))

UXO-Qualified Individual
Individual meeting the requirements for the positions of UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, or Senior UXO Supervisor. For qualification requirements, refer to EP 1110-1-18.

US Army Corps of Engineers®

EP 75-1-2
01 August 2004

MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND CONSTRUCTION ACTIVITIES

ENGINEER PAMPHLET

"Approved for public release; distribution is unlimited."

AVAILABILITY

Electronic copies of this and other U.S. Army Corps of Engineers publications are available on the Internet at http://www.hnd.usace.army.mil/techinfo/engpubs.htm. This site is the only repository for all official USACE engineer regulations, circulars, manuals, and other documents originating from HQUSACE. Publications are provided in portable document format (pdf).

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

EP 75-1-2

CEMP-CE

Pamphlet
No. 75-1-2

01 August 2004

Explosives
MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND CONSTRUCTION ACTIVITIES

1. Purpose. This pamphlet provides U.S. Army Corps of Engineers (USACE) personnel with procedural guidance, technical specifications, personnel and training requirements, and health and safety criteria for Munitions and Explosives of Concern (MEC) support during HTRW and construction activities.

2. Applicability. This pamphlet applies to all Headquarters, U.S. Army Corps of Engineers (HQUSACE) elements, USACE Major Subordinate Commands (MSCs), USACE geographic districts, and field operating activities having responsibilities for civil works and/or military programs with HTRW-related and construction projects that have the potential for encountering MEC. The MEC support requirements presented in this pamphlet are applicable to anomaly avoidance activities conducted during HTRW activities, standby MEC support during construction activities, and subsurface removal of MEC during construction activities. Guidance presented in this pamphlet is consistent with policy in ER 385-1-95. Contact the Military Munitions Center of Expertise (MM CX) for additional information.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References. Required and related references are at Appendix A.

5. Explanation of Acronyms and Terms. Acronyms and special terms used in this pamphlet are explained in the glossary.

FOR THE COMMANDER:

3 Appendices
(See Table of Contents)

JOHN R. McMAHON
Colonel, Corps of Engineers
Chief of Staff

This pamphlet supersedes EP 75-1-2, dated 20 November 2000.

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
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EP 75-1-2

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CHAPTER 1

Introduction

1-1. General. This Engineer Pamphlet (EP) presents procedures for providing Munitions and Explosives of Concern (MEC) support during Hazardous, Toxic, and Radioactive Waste (HTRW) and construction activities. MEC support activities include: anomaly avoidance activities conducted during HTRW activities; standby MEC support during construction activities; and subsurface removal of MEC during construction activities.

a. During the investigative/design phase of any project on a site known or suspected to contain MEC, provisions for MEC support will be included. MEC support refers to anomaly avoidance techniques implemented to avoid any potential surface MEC and any subsurface anomalies. The U.S. Army Corps of Engineers (USACE) primarily implements anomaly avoidance procedures on HTRW sites. Intrusive anomaly investigation is not authorized during anomaly avoidance activities. Although the examples of anomaly avoidance techniques in this EP pertain to HTRW-related activities, the procedures may be modified to address other types of activities, as appropriate. For additional information on anomaly avoidance techniques, contact the Military Munitions Center of Expertise (MM CX). See Chapter 5 for a discussion on anomaly avoidance procedures to be used during HTRW activities and Chapter 6 for MEC support during construction activities.

b. MEC support during construction activities, including the remediation phase of an HTRW project, on a site with known or suspected MEC may include only MEC standby support or may require a subsurface removal response. As described in Chapter 12 of DOD 6055.9 STD, the level of MEC support required during construction activities is dependent on the probability of encountering MEC. Contact the MM CX for guidance and assistance in determining the level of support.

(1) If the probability of encountering MEC is low (e.g., current or previous land use leads to an initial determination that MEC may be present), only MEC standby support will be required. MEC standby support is discussed in paragraph 6-6 of this document.

(2) When a determination is made that the probability of encountering MEC is moderate to high (e.g., current or previous land use leads to a determination that MEC was employed or disposed of in the area of concern), Unexploded Ordnance- (UXO-) qualified personnel must conduct a subsurface removal for the known construction footprint and remove all discovered MEC.

(3) The level of effort for construction support is site/task-specific and will be determined on a case-by-case basis by the project delivery team (PDT).

c. If MEC is encountered after initiation of an HTRW or construction project where MEC support has not been instituted, the procedures published in this EP will apply.

d. The MM CX will determine procedures for sampling and cleanup of Munitions Constituents (MC) contaminated with primary explosives on a case-by-case basis. The HTRW Design District is responsible for the design and removal or remedial action to clean up soils contaminated with secondary explosives. Refer to ER 1110-1-8153 for definitions of primary and secondary explosives. Contact the MM CX for the latest procedures to be used for MC sampling.

1-2. Responsibilities.

a. All USACE personnel involved with the Military Munitions Response Program are responsible for safely executing military munitions response projects, including MEC support during HTRW and construction activities, in accordance with applicable laws, regulations, and policies. A detailed discussion of USACE organizational responsibilities for military munitions response projects is presented in ER 1110-1-8153. Safety and health requirements, responsibilities, and procedures for MEC operations (response actions and any other MEC activity) are defined in ER 385-1-95.

b. All USACE organizations will ensure that all personnel with authorized access to the site for MEC support during HTRW and construction activities are familiar with, and have access to, copies of the accepted Work Plan and Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP). In addition, each organization will ensure that such personnel receive the appropriate training, medical surveillance, and personal protective equipment (PPE) required by the safety plan, contract specifications, Occupational Safety and Health Administration Standards, USACE regulations, and applicable Department of Defense (DOD) and Department of the Army (DA) regulations.

1-3. Functional Roles. The following section provides a description of the functional roles for MEC support activities. A more comprehensive description of the functional roles for the organizations discussed below is also provided in ER 1110-1-8153.

a. Headquarters, U.S. Army Corps of Engineers (HQUSACE). If an Explosives Safety Submission (ESS) is required for MEC support activities, it will be reviewed and approved by the MM CX acting for HQUSACE.

b. Major Subordinate Command (MSC). If an ESS is required for MEC support activities, it will be monitored by an MSC in accordance with ER 1110-1-8153.

c. District. A district will:

(1) Execute MEC support activities.

(2) Assign a Project Manager (PM) to lead the PDT, coordinate all project activities, serve as a liaison with other stakeholders, and review/approve project documents as required.

(3) Conduct MEC support activities with either in-house resources or by contract.

(4) Coordinate the MEC support project with the MM CX.

(5) Prepare a project-specific Statement of Work (SOW) and Independent Government Estimates (IGE) for MEC support activities.

(6) Submit plans developed for MEC support activities to the MM CX. All MEC concerns will be addressed before initiating any on-site activities.

(7) If an ESS is required, review the ESS and provide comments and written concurrence or nonconcurrence.

(8) Supervise the fieldwork. MEC operations will be supervised by UXO-qualified personnel as defined in ER 385-1-95.

(9) Conduct appropriate quality verification activities.

(10) Coordinate requests for explosives ordnance disposal (EOD) support from the 52nd Ordnance Group (EOD) with the MM CX.

(11) Coordinate with the appropriate Military Munitions Design Center (MM DC), as necessary.

d. MM DC. If an ESS is required for planned MEC support activities at a site, the appropriate MM DC will ensure its proper planning and preparation. The MM DC provides construction support/MEC support as defined by the district.

e. MM CX. The MM CX will:

(1) Review and provide comments and written concurrence or nonconcurrence on MEC support-related products (e.g., SOW, Work Plan, and ESS) to ensure compliance with Federal, DOD, DA, and USACE MEC safety and environmental regulations.

(2) Provide MEC technical support to any USACE office conducting construction and/or HTRW operations in areas where MEC is suspected or known to exist.

(3) Develop and/or approve MEC-specific contract requirements, including military munitions response contractor personnel qualifications and work standards, for contract acquisition.

(4) Assimilate and analyze lessons learned from MEC support projects and provide them to the HTRW CX for inclusion in the USACE lessons learned database.

(5) Coordinate support with the 52nd Ordnance Group (EOD) in accordance with the Memorandum of Agreement between the U.S. Army Engineering and Support Center, Huntsville (USAESCH) and the 52nd Ordnance Group (EOD).

(6) Coordinate the review and approval of an ESS (if required) with the U.S. Army Technical Center for Explosives Safety, and the Department of Defense Explosives Safety Board (DDESB).

(7) Provide construction support/MEC avoidance to districts as requested.

f. OE Safety Specialist. If a subsurface removal response is being conducted in support of construction activities, an OE Safety Specialist will be present to provide safety oversight. Otherwise, an OE Safety Specialist is generally not required on-site. Additional information on the requirements for when an OE Safety Specialist is required on site is available in ER 385-1-95.

CHAPTER 2

Statement of Work/Independent Government Estimates

2-1. Introduction. This chapter provides guidance on preparing an SOW and IGE for MEC support during HTRW and construction activities. The district is responsible for executing the SOW and IGE for MEC support activities.

2-2. SOW.

a. General. Safety and health are overriding concerns during MEC support project design and execution. The MM CX safety personnel are points-of-contact (POCs) for MEC safety issues and have particular, specialized expertise in identifying, interpreting, and implementing applicable safety requirements for military munitions response to MEC projects. Each SOW for MEC support activities must be closely coordinated with these personnel.

b. Preparation.

(1) The PM along with the PDT is responsible for preparing the SOW required for MEC support activities in conjunction with HTRW or construction activities. The MM CX may be consulted to provide the appropriate statements or paragraphs concerning background and authority for the task order or contract award.

(2) Appendix B provides an example SOW for anomaly avoidance during HTRW activities on sites with known or suspected MEC. Appendix C provides an example SOW for MEC support during construction activities on sites with known or suspected MEC. The appropriate MEC support SOW may be used as an addendum to a larger SOW for an existing project. If the intrusive investigation of anomalies is deemed necessary, the SOW for MEC support during construction activities should be used.

(3) The examples provided in Appendices B and C should be followed to ensure that the applicable requirements (i.e., site visit, Work Plan preparation, MEC support procedures, quality control, reporting, and public affairs assistance) are included. The MM CX should assist in the drafting of SOW verbiage when MEC support is required for HTRW activities not specifically referenced in Appendix B or when construction activities other than those presented in Appendix C are proposed and MEC support is required.

(4) Neither of these examples contains provisions for a records search by the contractor to determine what types of MEC might be encountered. Districts should consider completing a records search to determine the probability for contact with MEC and the potential types and quantities before using the SOW in Appendix B or C.

c. Review Process. Following the preparation of the SOW by the PDT, the PM will submit copies to the MM CX for review. The MM CX will provide comments and written concurrence or nonconcurrence for the decision/approval authority. The MM CX will be allowed 15 calendar days from receipt of the SOW for this review. If no comments are received within this time frame, concurrence may be assumed by the executing agency.

2-3. Preparation of the IGE. Once the SOW is prepared, an IGE for anomaly avoidance during HTRW or construction activities is prepared. The structure of the cost estimate will vary depending on the contract type. The recommended USACE software programs to be used in preparing cost estimates are the Micro Computer-Aided Cost Engineering System (MCACES), Gold Version 5.3; MCACES for Windows; Lotus 123™ spreadsheets; or Excel™ spreadsheets. The cost estimator or project engineer may develop crew and productivity sheets for the various field activities or tasks in the SOW to determine the duration or number of hours for the various labor categories needed to support each task. The labor rates are burdened rates and reflect all contractor mark-ups. Materials, travel, and per diem are duration driven and are totaled separately from the labor. The materials estimated can be purchased, rented, or allocated to overhead.

CHAPTER 3

Planning Considerations for MEC Support

3-1. Introduction. This chapter discusses the requirements that must be addressed prior to initiating MEC support activities during HTRW and construction activities on sites known or suspected to contain MEC. The objective of MEC support activities is to conduct safe and efficient operations while limiting potential exposure to a minimum number of personnel for a minimum time and to the minimum amount of MEC.

3-2. Planning Documents. Site-specific planning documents that detail the methodologies that will be used during the MEC support project will be prepared. For anomaly avoidance activities, the planning document is the HTRW Work Plan. For MEC support during construction activities, the planning documents include the Work Plan and appropriate subplans and appendices (and an ESS, if required). For range construction projects (including target maintenance), the planning documents include plans and specifications (an ESS is not required). The planning documents will be prepared in accordance with the project SOW and contract requirements. The PDT will ensure that these documents are consistent with each other.

3-3. MEC Support Work Plan.

a. For anomaly avoidance and construction activities, a MEC Support Work Plan will be prepared to supplement the prime contractor's or USACE's Work Plan/Site Plan. The MEC Support Work Plan will be prepared in accordance with the project SOW and contract requirements.

b. Content. The MEC Support Work Plan does not need to be comprehensive, as it is a supplement to the overall site Work Plan. The MEC Support Work Plan will detail the management approach and operational procedures that will be used to complete the MEC support activity. The MEC Support Work Plan will indicate the specific geophysical instrument that the UXO team intends to use. The MEC Support Work Plan will include an APP/SSHP that specifically addresses MEC operations. The PDT will ensure that the MEC Support Work Plan and all appropriate subplans (e.g., APP/SSHP, ESS, etc.) are consistent.

c. The MEC Support Work Plan will be submitted by the contractor to the PM for review and comment by the PDT. The PM will then forward one copy to the MM CX. The MM CX will review and provide comments and written concurrence or nonconcurrence on

the planning documents containing MEC support provisions. The MM CX will be allocated 15 calendar days from the date of receipt for this review. If no comments are received from the MM CX within this time frame, concurrence will be assumed by the executing agency.

d. The accepted MEC Support Work Plan will serve as the contractual basis for all subsequent MEC activities. Current copies of the MEC Support Work Plan will be kept for reference by the PM, the contractor's senior site representative or safety manager, the UXO team, and the OE Safety Specialist (if required onsite). The accepted MEC Support Work Plan will be maintained in the district office.

e. For those sites where subsurface removal in support of construction activities is required, the MEC Support Work Plan will contain the appropriate subplans and appendices from the following list, based on the MEC support project requirements and information already contained in the overall Work Plan:

(1) Technical Management Plan.

(2) Explosives Management Plan.

(3) Explosives Siting Plan (ESP).

(4) Geophysical Prove-out Plan and Report.

(5) Geophysical Investigation Plan.

(6) Geospatial Information and Electronic Submittals.

(7) Work, Data, and Cost Management Plan.

(8) Property Management Plan.

(9) Quality Control (QC) Plan.

(10) Environmental Protection Plan.

(11) Investigative Derived Waste (IDW) Plan.

(12) Appendix – Task Order SOW.

(13) Appendix – Site Maps.

(14) Appendix – Local POCs.

(15) Appendix – APP/SSHP.

(16) Appendix – Munitions Constituents Sampling and Analysis Plan.

(17) Appendix – Contractor Forms.

(18) Appendix – Minimum Separation Distance (MSD) Calculation Sheets.

(19) Appendix – Resumes.

f. Modifications. Changes may be required to the MEC Support Work Plan and/or APP/SSHP after approval by the Contracting Officer. A modification that affects any MEC subsurface removal operational and/or safety procedure may also require a revision to and re-approval of the ESP and/or ESS.

3-4. ESP.

a. General.

(1) An ESP, a component of the MEC Support Work Plan, is prepared only for MEC support during construction activities where MEC removal is planned. The ESP will provide explosives safety criteria for planning and siting explosive operations. The ESP discusses the proposed MSDs for unintentional detonations, intentional detonations, and siting of critical project components. The ESP will describe the basis of design, all design calculations, and proposed hazard mitigation measures to be implemented to protect the public, non-project personnel, and site workers from explosive hazards. The ESP will be reviewed by the PDT to ensure that the appropriate MSD criteria have been applied.

(2) The ESP will discuss the following explosive operations: Munitions Response Areas (MRAs), explosives storage magazines, and planned or established demolition areas. The location of these explosives operations will be sited on a map with a scale of 1 inch equals 400 feet. A larger scale may be used if available and if a map using such a scale is not too large to be included in the Work Plan. A smaller scale is acceptable if distances can be accurately shown. If an unscaled map is used, the map must have labeled distances. The MSDs calculated for the operation will be discussed in the text of the plan and Quantity-Distance (Q-D) arcs for the above-listed project elements will be drawn on the map.

(3) Q-D. Explosives safety distance tables prescribe the necessary separations and specify the maximum quantities for various classes of explosives permitted in any one location. The Q-D tables provided in DOD 6055.9-STD reflect the acceptable minimum criteria for the storage and handling of various classes and amounts of explosives. These distances will be used for siting storage locations. The project will site Open Burn/Open Detonation areas in accordance with EP 1110-1-17.

b. MRAs. During intrusive operations (i.e., operations that involve or result in the penetration of the ground surface at an area known or suspected to contain MEC. See EP 1110-1-18 for additional details), the MSD will be determined using two sets of criteria. The first set of criteria has been established for unintentional detonations (i.e., not planned in advance), and the second set of criteria has been established for intentional detonations (i.e., planned, controlled detonations). Details on calculating MSDs are published in EM 1110-1-4009.

(1) Unintentional Detonations. For an unintentional detonation, the applicable MSDs are the MSDs for unintentional detonations and the team separation distance (TSD). The MSD for unintentional detonations is the minimum distance that non-essential personnel and the public must be separated from intrusive operations. The TSD is the minimum distance that project teams must be separated during intrusive operations.

(2) Intentional Detonations. The MSD for intentional detonations is the distance that both project personnel and the public must be from the intentional detonation.

c. Explosives Storage Magazines.

(1) The ESP will provide the following information on explosives storage magazines:

(a) Type(s) of magazines used (e.g., Bureau of Alcohol, Tobacco, and Firearms (ATF) classification, portable, commercial, above ground, shed, earth covered, etc.). See DOD 6055.9-STD for further information and definitions on the types of magazines to be used for explosives storage.

(b) Net Explosive Weight (NEW) and hazard division to be stored in each magazine. Generally, recovered MEC is considered Hazard Division 1.1. See 6055.9-STD for further information and definitions on Hazard Divisions.

(c) Q-D criteria used to site the magazine.

(d) Design criteria for any proposed engineering controls to be used to mitigate exposures to the public when Q-D criteria cannot be met.

(2) Magazines must also be properly placarded, and the property must be secured. DOD magazines storing explosives must have the appropriate fire fighting symbol or locally required DOD Hazard Classification assigned. Additional details on how explosives must be stored and secured are published in EP 1110-1-18.

d. Planned or Established Demolition Areas. The MSDs for these areas will be based on the MSD criteria for intentional detonations.

e. Footprint Areas. The following footprint areas will be discussed in the ESP: blow-in-place, collection points, and in-grid consolidated shots. These areas, however, do not have to be shown on the site map. The MSDs for these footprint areas are described in the following paragraphs.

(1) Blow-in-Place. Blow-in-place is the preferred method for disposal of MEC. Blow-in-place occurs when a MEC is prepared for detonation and detonated in-place. The MSD for blow-in-place areas will be determined using the MSD criteria for intentional detonations.

(2) Collection Points. Collection points are areas where recovered MEC that is acceptable to move is temporarily accumulated within a search grid pending relocation to another area for storage or destruction. Collection points will be limited to the amount of explosives such that the K50 total of the rounds to be destroyed will not exceed the MSD. (The K value is the safety factor used in determining the MSD for unintentional detonations. See DOD 6055.9-STD for additional details on the establishment of K values.) The MSD for collection points will be determined using the MSD criteria for unintentional detonations.

(3) In-Grid Consolidated Shots. In-grid consolidated shots occur when recovered MEC that is acceptable to be relocated is collected and destroyed within a search grid. In contrast to an established demolition ground, consolidated shots occur within a search grid rather than in a separate area. The procedures for in-grid consolidated shots are presented in the USAESCH document titled “Procedures for Demolition of Multiple Rounds (Consolidated Shots) on OE Sites.”

f. Exceptions. The calculated MSDs for unintentional detonations specified above are considered minimums for execution of normal operations. When site conditions exist that make it impossible or impractical to comply with these minimums, the PM may request consideration of a possible reduction. Any request for a reduction of these MSDs will be

staffed through the MM CX for calculation. This information will be forwarded to the PM, who will forward it to the District Safety Office for a decision concerning the reduction of the exclusion area. For any requested reduction to the specified MSDs for unintentional detonations, a detailed hazard analysis, which explains why these reductions are necessary and acceptable, must be documented.

3-5. Conventional ESS.

a. ESS.

(1) The purpose of the ESS is to ensure that all applicable DOD and DA regulations regarding safe and secure handling of military munitions are followed.

(2) Intrusive activities cannot commence until the DDESB approves the ESS and the contractor has been directed to incorporate changes resulting from ESS approval into the MEC Support Work Plan. A copy of the approved ESS will be maintained at the project site. All operations will be executed in accordance with the approved ESS.

(3) Detailed guidance on the preparation and approval process associated with the ESS may be found in EP 385-1-95b and DDESB's "Memorandum Guidance for Clearance Plans."

b. Construction support involving removal of MEC in the construction footprint will require submittal and approval of an ESS. An ESS is not required for standby construction support or anomaly avoidance. The ESS will be tailored to meet site-specific requirements.

c. When an element of the approved ESS changes, the ESS must be changed. The contractor shall prepare the proposed change and forward it to the PM, who will forward it to the MM CX for review. The MM CX will forward the proposed changes to the appropriate agency for approval. For a change that specifies less restrictive requirements (e.g., reduction in the exclusion zone), the contractor shall comply with the accepted ESS until the change is approved. When the proposed changes would result in more restrictive requirements (e.g., increase in the exclusion zone), the contractor shall apply the more restrictive measures immediately during the ESS change approval process.

3-6. Personnel Qualifications and Work Standards. USACE has set forth personnel standards applicable to all UXO personnel working for USACE. These qualifications and standards, which detail the educational and experience requirements for UXO personnel, are available in EP 1110-1-18.

3-7. Training. USACE and contractor personnel shall be in compliance with training requirements prior to conducting MEC support activities. Training requirements are published in EP 1110-1-18. The training topics included in EP 1110-1-18 pertain to 29 CFR 1910, 29 CFR 1926, Initial Training, Refresher Training, Cardiopulmonary Resuscitation (CPR)/First Aid, Medical Surveillance, Visitor Training, and Blood Borne Pathogen training. Additional training information is contained in ER 385-1-95.

3-8. Explosives Safety. There are no "safe" methods for dealing with MEC, merely procedures and process controls that are designed to reduce potential hazards. Maximum safety in conducting any MEC operations can be achieved through adherence to applicable safety precautions, a planned approach, intensive supervision, and MEC safety oversight. UXO-qualified personnel will conduct a site safety briefing prior to commencing operational activities each workday. All activities with potential exposure to MEC will be reviewed to identify the associated risks and appropriate mitigation procedures. Operations within areas suspected of containing MEC must be conducted in a manner that exposes a minimum number of people to the smallest quantity of explosives for the shortest period of time.

a. General Safety Considerations.

(1) General safety considerations applicable to personnel, both essential and non-essential, at project sites where MEC may be encountered include:

(a) Do not carry fire or spark-producing devices.

(b) Do not conduct explosive or explosive-related operations, without approved procedures, proper supervision, and MEC standby support.

(c) Do not become careless by reason of familiarity with MEC or the reported probability level of MEC.

(d) Do not conduct explosive or potentially explosive operations during inclement weather.

(e) Avoid contact with MEC except during MEC removal conducted during construction activities.

(f) Conduct MEC-related operations during daylight hours only.

(g) Employ the "buddy system" at all times.

(2) EP 385-1-95a provides additional considerations for safety at project sites where MEC may be encountered.

b. Activity Hazard Analysis.

(1) Activity Hazard Analyses will be performed in accordance with EM 385-1-1. Activity Hazard Analyses will be conducted by personnel who are knowledgeable with respect to MEC safety standards and requirements. These personnel must understand the specific operational requirements and hazard analysis methodologies. A hazard analysis will be performed for each activity to determine the significance of any potential explosive-related hazards. For example, residual explosives from ordnance fillers may be exposed during an HTRW sampling activity. Explosive residues may be in the form of powder or various granular and powder-based pellets. These contaminants can enter the body through the skin or by ingestion if proper personal hygiene practices are not followed. Explosive fillers such as white phosphorus are dangerously reactive in air and acute exposure can result in serious injury to the skin, eyes, and mucous membranes. They are also a fire hazard.

(2) Safety requirements (or alternatives) that will either eliminate the identified hazards or control them to reduce the associated risks to an acceptable level will be developed. The adequacy of the operational and support procedures that will be implemented to eliminate, control, or abate identified hazards or risks will then be evaluated and a second risk assessment completed to verify that a satisfactory safety level has been achieved.

c. Hazards of Electromagnetic Radiation to Ordnance.

(1) Some ordnance items and other electro-explosive devices (EEDs) are particularly susceptible to electromagnetic radiation (EMR) in the radio frequency (RF) range originating from devices such as radio, radar, and television transmitters. The presence of antennas and communication and radar devices will be noted on initial site visits and/or preliminary assessments of eligibility. In addition, active and passive subsurface detection devices emit EMR/RF. Each type of equipment producing EMR/RF must be reviewed and a hazard analysis completed. The level of EMR/RF susceptibility and potential hazard is a result of the design and type of MEC or EED that may be present. Therefore, a knowledge of what MEC is normally unsafe in the presence of EMR/RF is important so that preventive steps can be taken if such MEC is encountered. The MM CX will be consulted when geophysical investigations are planned in areas potentially containing electric-fuzed ordnance.

(2) As part of the hazard analysis, the MSD between an EMR/RF emitting device and potential EEDs will be calculated. This calculation is based on the characteristics of the transmitting device and the potential EEDs. The important characteristics of the EMR/RF source device include:

(a) The transmitter frequency (f, in MHz).

(b) The peak envelope transmitting power (Pt, in W).

(c) The transmitter gain (GdB).

(3) Minimum safe distances from EMR/RF sources are listed in Tables 2-2, 2-3, and 2-4 of TM 9-1375-213-12.

3-9. PPE.

a. All UXO team members will be trained in the use of, medically qualified for, and physically able to wear the prescribed PPE. PPE for MEC support operations will be determined by site-specific and task-specific analyses, documented in the APP/SSHP, and worn as indicated in the plans. Specific requirements for PPE are described in the following paragraphs.

(1) PPE will comply with the most stringent requirements of EM 385-1-1 and the applicable portions of 29 CFR 1910 Subpart I or 29 CFR 1926 Subpart E.

(2) Footwear. In addition to the applicable requirements in the references cited above, shoes or boots with high traction soles and ankle protection will be used. During geophysical detection activities, UXO personnel will not wear safety shoes or other footwear that would cause interference with instrument operations.

(3) Clothing. Short sleeve shirts and long pants are considered the minimum clothing suitable for MEC operations and will be worn at all work sites, unless variations are described, analyzed, and documented in the accepted APP/SSHP.

(4) Head Protection. Personnel working in or visiting designated hardhat areas will be required to wear head protection meeting ANSI Z89.1 standards. Hardhat areas for MEC operations will not be designated unless the activity hazard analysis shows a possible overhead hazard.

b. UXO personnel using PPE will be knowledgeable of the limitations of the selected PPE as well as the reduced performance levels the equipment might impose on them when they are conducting assigned tasks.

3-10. Fire Prevention.

a. Fire prevention awareness is especially important in areas with known or suspected MEC. Smoking will be permitted only in controlled areas where all combustibles (e.g., vegetation, fuel cans, sampling supplies) have been removed or sufficient firebreaks have been established. Personnel may attempt to extinguish minor fires with fire extinguishers if they are trained to do so safely without endangering themselves or others within the vicinity of the fire.

b. If a fire becomes uncontrollable or extends into areas that may contain MEC, all personnel must immediately suspend any fire fighting efforts and retreat to a safe distance, which is at least the maximum fragment distance of the military munition with the greatest fragmentation distance (MGFD), (i.e., the military munition with the greatest fragmentation distance that might be recovered as a result of previous training activities based on historical information). Personnel will retreat upwind of the fire. The senior UXO-qualified person present will then lead an immediate evacuation of the area using available resources to ensure the safety of all personnel.

3-11. Emergency Procedures. MEC operations may result in accidents or incidents, regardless of the safeguards implemented. The APP/SSHP will describe site-specific emergency response procedures, including identification of all appropriate POCs. All personnel must be briefed on the emergency response procedures and protocols discussed in the APP/SSHP.

a. Contingency Plan. A contingency plan will be developed if anomaly avoidance is going to be conducted, to detail the procedures that will be used in the event that munitions with unknown fillers and/or Recovered Chemical Warfare Materiel (RCWM), unusual odors, or discolored soil are encountered. The contingency plan will be initiated if munitions with unknown fillers and/or RCWM, unusual odors, or discolored soil is encountered or site personnel exhibit symptoms attributable to a chemical exposure (i.e., respiratory irritation and/or skin irritation).

b. Emergency Response. In the event of a MEC-related emergency on-site during anomaly avoidance, the senior UXO-qualified person present will direct the course of action until the local POC designated in the Work Plan has been notified. In the event of a MEC-

related emergency on-site during construction support, the Senior UXO Supervisor (SUXOS) will direct the course of action until the local POC designated in the Work Plan has been notified. It may be necessary for other on-site personnel to provide assistance. If an emergency response rescue operation is required, no one will reenter the accident area until the hazards of the situation have been assessed by the responsible individual (see above), and all required resources are on-hand to complete the rescue without jeopardizing the safety of rescue personnel.

c. Emergency Rescue. The senior UXO-qualified person or the local POC, as applicable, will direct any MEC-related emergency response rescue operation. Response considerations include the following elements:

(1) Designation of an emergency response vehicle(s) to remain on-site during rescue operations.

(2) Determination of existing hazards, as well as the potential for additional hazards.

(3) Notification of local officials.

(4) Coordination with USACE in the review of the need to alert the local community and/or subsequent coordination with installation or other customer's Public Affairs Office.

(5) Assessment of the situation and condition of any victims.

(6) Determination of the resources needed for victim stabilization and transport and additional emergency support.

(7) Enforcement of the "buddy system". No one will be permitted to enter a rescue area alone.

(8) Oversight of the removal of injured personnel from the area.

(9) Consultation with on-site safety officers to establish decontamination protocols. Decontamination of injured parties will be accomplished after stabilization of their medical conditions. Decontamination need not be accomplished if the victim's condition is poor and if the decontamination process may cause an immediate threat or additional injury to the victim. If contamination is suspected, the victim will be wrapped in material that will prevent the spread of contamination during extraction and transport. Emergency medical personnel will be advised of potential injuries, as well as potential contamination, of the patient as early

as possible. The patient will not be transported to a medical facility without prior notification of, and coordination with, the receiving facility regarding potential contamination.

d. Mishap Reporting and Investigation Requirements. The following information provides guidelines to be followed for reporting explosive mishaps on MEC support projects. Site-specific reporting and investigation procedures, including identification of appropriate POCs, will be included in the APP/SSHP.

(1) Reporting Requirements. All mishaps shall be investigated by the contractor and reported to the Contracting Officer and OE Safety Specialist or to the government authority cited in the SOW. Notification and reporting of mishaps will be in accordance with USACE Supplement 1 to AR 385-40 and EM 385-1-1. Any mishap will be reported on ENG Form 3394, Accident Investigation Report.

(a) For anomaly avoidance and standby support projects on Formerly Used Defense Sites (FUDS), the senior UXO-qualified person on-site is responsible for mishap reporting. For subsurface removal projects in support of construction activities at FUDS, the contractor's UXO Safety Officer (UXOSO) is responsible for mishap reporting. For contracts under the supervision of the district, mishaps will be reported to the district safety office. An information copy of the accident report will be forwarded to the MM CX. USACE district personnel will report through command channels to the HQUSACE Safety and Occupational Health Office.

(b) On active installations, the installation safety officer is responsible for reporting any explosive mishaps.

(c) RCWM Incidents. Chemical event reports are required to be submitted in accordance with AR 50-6. Reporting requirements are identified in EP 75-1-3. A site-specific POC will be identified and documented in accordance with the reporting requirements listed above.

(2) Investigation Requirements. In the event of a mishap, the contractor shall implement emergency procedures and secure the scene to keep unauthorized persons away for their protection and to preserve the evidence for the subsequent mishap investigation. On active installations, the U.S. Army Safety Center (USASC) maintains the prerogative to investigate Class A or Class B explosive mishaps (as defined in AR 385-40). If USASC chooses to investigate, it is the lead agency. If USASC chooses not to investigate, then the district is the lead agency.

3-12. Hazardous Waste Manifest.

a A hazardous waste manifest (EPA Form 8700-22) is required when transporting MEC over pubic roads. Information guidance on the hazardous waste manifest is provided in 49 CFR 172.205 and 40 CFR 262.20.

b Government personnel who are tasked to certify MEC on hazardous waste manifests will be trained in accordance with the requirements of DOD 4500.0-R, Defense Transportation Regulation, Part II, Cargo Movement, Chapter 204, Paragraph D.1.b. or D.1.e.

c The MM CX is available to assist with the proper identification of MEC on the hazardous waste manifest. In addition to the MM CX, the following personnel, based on their knowledge and training, may assist with proper identification; any USACE OE Safety Specialist, contractor UXO Technician, or Military EOD Technician.

CHAPTER 4

Geophysical Detection Equipment

4-1. Introduction. This chapter presents an overview of available geophysical detection systems, their capabilities and limitations. There are many techniques beyond those mentioned in this chapter that have application to the detection of surface MEC and subsurface anomalies. No single detection system can effectively detect all types of military munitions at all locations and depths.

4-2. Factors to Consider.

a. When selecting a geophysical survey instrument for the detection of subsurface anomalies, it is necessary to consider the maximum possible depth of MEC. If MEC is intentionally buried, the factors affecting burial depth may include the type of soil, mechanical versus hand excavation, depth of the water table, etc. If the military munition was fired or dropped, then the depth of penetration can be estimated by considering the soil type, military munition type and weight, and impact velocity. There are many cases where UXO can penetrate deeper than geophysical instruments can currently reliably detect. On such sites, it is possible that undetected UXO remains deeper than it can be detected from the existing ground surface.

b. Geophysical detection equipment used to locate subsurface MEC for avoidance or removal is seldom 100 percent effective. In many cases, military munitions may simply be located too deep, may be too small to be detected, or may be constructed of a material difficult to detect. Since the total number of subsurface MEC at a site is almost never known, complete detection cannot be documented. In addition, most commonly used geophysical survey systems will not detect subsurface bulk explosives. These factors must be considered when designing and implementing MEC support. If subsurface bulk explosives are anticipated based on archival data, then special avoidance techniques must be developed and increased safety precautions employed. Contact the MM CX for additional information. The limitations of detection capabilities must be conveyed to all on-site personnel so that there is a common understanding of expectations.

c. Data collection capability typically depends on the complexity and type of the geophysical instrument used. For instance, most handheld magnetometers cannot record the data produced. However, more complex systems are capable of collecting the data for downloading and processing. Requiring an instrument with the capacity to collect data is

activity-dependent. Anomaly avoidance procedures generally do not require data collection. However, removal operations in support of construction activities generally require the area to be mapped and, therefore, require instruments that are capable of downloading information.

4-3. Types of Instrumentation. The most successful geophysical detection systems for MEC rely on one of two technologies, magnetometry or electromagnetics. Magnetometers are limited to detecting ferrous items. Electromagnetic detectors can detect any conductive metal.

a. Magnetometry.

(1) Magnetometers were one of the first tools used for locating buried military munitions and remain one of the best. Most bombs and gun shells contain iron that causes a disturbance in the earth's geomagnetic field. A magnetic survey measures differences from the earth's normal magnetic field that can be attributed to the presence of ferrous objects. Some magnetometers, which are called gradiometers, use two magnetic sensors configured to measure the difference over a fixed distance of the magnetic field (gradient), rather than the absolute magnetic field. Magnetometers are extremely sensitive and capable of identifying small anomalies. They respond only to ferro-magnetic metals. In addition, magnetometers are sensitive to iron-bearing minerals contained in soils and rock.

(2) Magnetometry will not detect subsurface bulk explosives. If subsurface bulk explosives are anticipated based on the site's history, increased safety precautions and special techniques will be employed. Contact the MM CX for additional information.

(3) Two types of magnetometers and gradiometers are most often used to detect buried military munitions, fluxgate magnetometers and optically pumped magnetometers.

(a) Fluxgate Magnetometers. Fluxgate magnetometers measure the magnetic field component along the axis of the core of the fluxgate. They are inexpensive, reliable, rugged, and have low energy consumption. Fluxgate magnetometers have long been a standard tool of EOD teams, used for a quick, inexpensive field reconnaissance of a site containing ferrous military munitions. However, most fluxgate magnetometers provide analog rather than digital output, which makes it difficult to apply computer enhancement techniques. Fluxgate magnetometers are the instruments typically used for downhole geophysics for anomaly avoidance.

(b) Optically Pumped Magnetometers. Optically pumped magnetometers (traditionally cesium-vapor or potassium-vapor magnetometers) measure the local absolute total magnetic field. They utilize digital technology and are more expensive to purchase than fluxgate

instruments. However, their high sensitivity, speed of operation, and high quality digital signal output make them a good choice for situations where data or digital post-processing is required.

b. Electromagnetic Detectors.

(1) Electromagnetic induction geophysical instruments are also extensively used to detect buried military munitions. They differ from magnetometers in that they are not limited to detecting ferrous items; they can detect any conductive metal. In addition, electromagnetic detectors are not affected by most of the iron-bearing rocks and soil that adversely affect magnetometers.

(2) There are numerous types of conductivity meters available. However, two types are most commonly used in the search for military munitions- frequency-domain electromagnetics and time-domain electromagnetic conductivity.

(a) Frequency-Domain Electromagnetics. Frequency-domain electromagnetic (FDEM) instruments can be useful to detect large buried caches of military munitions and detecting disturbed earth associated with pits and trenches. In addition, some types of FDEM instruments are the best geophysical tools available for detecting very small, very close objects such as the metal firing pins in plastic land mines buried just beneath the ground surface. However, since the resolution ability decreases dramatically with depth, frequency-domain conductivity meters are not optimum for detecting individual, deeply buried military munitions. Most commercial coin detectors are frequency-domain conductivity meters.

(b) Time-Domain Conductivity Electromagnetics. Time-domain conductivity electromagnetic (TDEM) instruments provide an excellent compromise between detection depth and resolution. These instruments provide a capability to locate all types of metallic military munitions and will see typical intact military munitions to depths of between 1 to 2 meters depending upon site-specific conditions.

4-4. Geophysical Investigation Performance.

a. General. The performance of military munitions detection instruments varies as a result of different site characteristics such as soil type, moisture content, depth to groundwater, vegetation, and type of military munition. Environmental and military munitions factors affecting the performance of detection instruments are so numerous that a prove-out of potential detection instruments for removal operations will be performed on the site to determine which instrument performs the best.

b. Data Quality Objectives/Performance Goals. Geophysical investigation data quality objectives and performance goals will be included in the contractor's SOW. The contractor may propose and document alternative objectives and goals for the Contracting Officer's consideration.

c. Horizontal Accuracy. Horizontally, 95 percent of all reacquired anomaly locations must lie within a 1 meter radius of their original surface location as marked on the dig sheet. Horizontally, 95 percent of all excavated items must lie within a 35-centimeter radius of their mapped surface location as marked in the field after reacquisition.

d. False Positives. If there are more than 15 percent "false positives" (anomalies reacquired by the contractor that result in no detectable metallic material recovered during excavations, calculated as a running average for the sector), a re-evaluation of the data, detection methods being utilized, and overall project QC will be performed at no cost to the government. A written response explaining the reason for the excessive false positive results and a Corrective Action Plan, if appropriate, will be submitted to the Contracting Officer within 10 days of identification of the situation.

4-5. Geophysical Prove-Out (GPO). Before geophysical surveys for buried military munitions can begin on a site, the proposed survey methods and techniques must be tested and evaluated. The purpose of the GPO is to demonstrate and document the site-specific capabilities of the proposed survey platform, sensors, navigation equipment, data analysis, data management and associated equipment and personnel to operate as an integrated system capable of meeting data quality objectives necessary to achieve project performance goals. The results of the GPO will identify realistic capabilities and limitations of applying geophysics at a particular site and aid in determining proper post-processing procedures for the geophysical data. Additionally, a prove-out demonstration offers the client an opportunity to observe the contractor's methods and to evaluate the contractor's ability to meet data quality objectives and compliance with project requirements. A prove-out must be constructed so that it is representative of the project site and the specific buried military munition items known or suspected to exist. The objective of the GPO is mainly to establish and maintain high levels of QC throughout this phase of the project. EM 1110-1-4009 provides a detailed list of general objectives for a GPO. The specific project objectives will be described in the GPO Work Plan. A GPO is needed for removal actions, but is not required for anomaly avoidance. Only a daily geophysical instrument function test is required for anomaly avoidance.

4-6. Equipment Standardization and QC Tests. Geophysical instruments have a number of standardization tests that need to be performed in order to ensure that they are functioning properly. For this discussion we will focus on the EM61 and GEM-3 (trade names of specific geophysical survey instruments) to identify some specific tests to be conducted.

a. Out-of-Box Equipment Tests. Past experience has shown that, too often, non-functioning equipment arrives at the site, causing delays in surveying, producing unreliable data, and increasing false alarms or missing buried military munitions. For this reason, the following out-of-box equipment tests are mandated to ensure that all instruments are operating correctly:

(1) Inventory and inspect all components.

(2) Assemble the instrument and power up.

(3) Test the instrument's cable connectors for shorts using the cable shake test.

(4) Null instrument (Electromagnetic (EM) only). The EM instrument will be nulled prior to conducting the following tests. Standard EM61 backpacks are provided with potentiometers for the top and bottom coils, which can be adjusted to null (zero) the instrument.

(a) Static Test. Establish an area for these tests that offers convenient access, is free of metal (surface and subsurface), and is sufficiently far from roads and power lines, transmitters, etc., to avoid these sources of noise. This same point may be used throughout the duration of the project for the daily static (background) test and response tests and for nulling instruments. Collect readings for a minimum of 3 minutes after instrument warm-up. Data collected during static tests will be retained for documentation.

(b) Instrument Response Test. The Instrument Response Test quantifies the response of the instrument to a standard test item. A steel trailer ball is a preferred test item that is easily acquired and transported. Leaving the instrument in the same position as used in the Static Test, place the test item below the sensor, then collect data for a minimum 3-minute period. The test will document the amplitude of response to the test item and instrument drift. To pass the Instrument Response Test, the value of the response must vary less than 20 percent from test to test.

b. Initial Geophysical Instrument Checks. Initial geophysical instrument checks will be performed on the first day of the survey. These tests include the following:

(1) Six-Line Test. This test is used for all geophysical instruments. Use an area that has little background noise and no sources of anomalous responses. The test line will be well marked to facilitate data collection over the exact same line each time the test is performed. Background response over the test line is established in Lines 1 and 2. A standard test item, such as a steel trailer hitch ball, will be used for Lines 3 through 6. Heading effects, repeatability of response amplitude, positional accuracy, and latency are evaluated in Lines 3 through 6. For anomaly avoidance, a test similar to a six-line test would be used in lieu of a prove-out.

(2) Azimuthal Test and Octant Test. These tests, applicable to magnetic instruments only, are performed to document the differences in readings based on orientation.

(3) Height Optimization Test. This test is applied to magnetic instruments, as well as for the GEM-3 instrument, and the EM61 used in harness or “litter” mode. A line is established with at least one test object along its length. Data is collected with the instrument using a minimum of three different sensor heights. The goal is to optimize the target signal-to-noise ratio and maintain adequate sensitivity.

(4) Pull-Away Test. This test demonstrates the effects of navigational equipment and/or vehicles used to tow sensors or arrays.

c. Daily Instrument Checks. Data collected in these tests must be closely examined each morning, before starting the collection of survey data. These tests will be performed for both removals and anomaly avoidance procedures.

(1) Cable Shake Test.

(2) Null instrument (EM only).

(3) Static Test: This test will be performed twice daily in the same location, prior to data collection, and at the end of the day. Data will be recorded during a minimum 3-minute duration static test to demonstrate stability of readings.

(4) Instrument Response Test: Following the static test, a standard test item will be placed below the sensor, and readings recorded for at least 3 minutes. Instrument response of equal amplitude from test to test demonstrates that the calibration of the instrument has not changed.

(5) Personnel Test: The instrument operator moves around the stationary, operating instrument to scan for any effects of metal remaining on his or her person.

4-7. Maintenance. Preventive maintenance will be performed on a regularly scheduled basis in accordance with the manufacturer's directions. If an equipment problem is encountered, maintenance will be performed as soon as possible and records of the unscheduled maintenance and corrective action will be maintained and will indicate equipment identification, problem description, corrective action, the person performing the maintenance, and associated costs. Equipment Standardization and QC Tests will be performed and the test results reviewed and accepted by the site or project geophysicist prior to the use of all repaired or new equipment received at the site.

CHAPTER 5

Anomaly Avoidance Procedures During HTRW Investigation/Design Activities

5-1. Introduction.

a. This chapter discusses anomaly avoidance procedures during the investigative/design phase of any project on a site with known or suspected MEC. USACE implements anomaly avoidance procedures primarily on HTRW sites where there is the potential to encounter MEC. HTRW-related activities during the investigative/design phase which have the potential for encountering MEC include, but are not limited to, surveying and mapping, environmental and natural resource assessments, surface and subsurface sampling, boring and drilling, and groundwater monitoring.

b. The purpose of anomaly avoidance during HTRW-related activities is to avoid any potential surface MEC and subsurface anomalies during sampling activities. Intrusive anomaly investigation is not authorized during anomaly avoidance operations. Procedures for dealing with explosives-contaminated soils are addressed in paragraph 1-1d of this pamphlet.

5-2. UXO Team Composition. For anomaly avoidance on an HTRW site with known or suspected MEC, the contractor shall provide a UXO team consisting of a minimum of two personnel, one of whom must be a UXO Technician II. This individual will be the UXO team leader. The UXO team must be on-site during all sampling activities. The UXO team may include additional UXO-qualified personnel, geophysicists, or any other team member, depending on site- and task-specific conditions/requirements. Contact the MM CX for a description of the current qualifications for contractor UXO personnel.

5-3. Planning. The MEC contractor shall prepare a Work Plan to supplement the HTRW contractor's or USACE's Work Plan/Site Plan, as described in Chapter 3.

5-4. Responsibilities. The UXO team members have the following responsibilities for anomaly avoidance procedures during an HTRW investigation project on a site with known or suspected MEC:

a. Provide the MEC recognition, location, and safety functions for the HTRW contractor during HTRW sampling activities.

b. Conduct MEC safety briefings for all site personnel and visitors.

c. Obtain utility clearance and/or excavation permits for underground utilities, if required, before the UXO team begins any incremental subsurface geophysical survey activities. The UXO team is responsible for verifying that all necessary excavation permits are on-site prior to commencing operations. The prime contractor is responsible for contacting the appropriate agency(ies) or company(ies) to mark the location of all subsurface utilities in the construction area. All located utilities will be marked by paint, pin flags, or other appropriate means to visually delineate their approximate subsurface routing. The color used for marking will not conflict with the colors used in MEC operations. If subsurface utilities are suspected to be present in an excavation area, the UXO team must attempt to verify their location.

5-5. Authority. The senior UXO-qualified person has final on-site authority on MEC procedures and safety issues.

5-6. Access Surveys. The UXO team must conduct a surface access survey and a subsurface survey for anomalies before any type of activities commence, including foot and vehicular traffic.

a. HTRW sampling personnel must be escorted by UXO-qualified personnel at all times in areas potentially containing MEC until the UXO team has completed the access surveys and the cleared areas have been marked. Escorted HTRW personnel will follow behind the UXO escort. If anomalies or MEC are detected, the UXO escort will halt escorted personnel in place, select a course around the item, and instruct escorted personnel to follow.

b. The UXO team will conduct an access survey of the footpath and/or vehicular lanes approaching and leaving HTRW sampling areas with known or suspected MEC. Typically, the access route will be at least twice as wide as the widest vehicle that will use the route.

c. The UXO team must also complete an access survey of an area around the proposed investigation site that is large enough to support all planned operations. The size of the surveyed area will be site-specific and will take into account, for example, maneuverability of required equipment (e.g., drill rigs, excavation equipment, etc.), parking of support vehicles, and establishment of decontamination stations. As a minimum, the surveyed area will have a dimension in all directions equal to twice the length of the longest vehicle or piece of equipment to be brought on-site.

d. Geophysical instrumentation capable of detecting the smallest known or anticipated military munition will be used to locate anomalies just below the surface that may be

encountered through erosion from rain or continual vehicular traffic. The various types of geophysical detection instruments are discussed in Chapter 4.

e. If anomalies or surface MEC are encountered, they will be marked with flagging and the investigation area will be relocated to avoid contact. The UXO team will clearly mark the boundaries of the surveyed area using survey flagging and pin flags. The UXO team will establish a system of flagging colors that will distinguish anomalies, surface MEC, and route boundaries from each other as well as from any utility markings that have been used at the site.

f. If surface MEC is encountered, the UXO team will assess the condition of the MEC to determine if a disposal action is required. MEC disposition will follow the procedures discussed in paragraph 5-13.

g. No personnel will be allowed outside the surveyed areas.

5-7. Surface Soil Sampling. Surface soil samples are normally collected at depths from zero to 6 inches below ground surface. The following paragraphs describe anomaly avoidance procedures for soil sampling between zero and 6 inches below ground surface on an HTRW site with known or suspected MEC. Soil sampling at depths greater than 6 inches below ground surface on an HTRW site with known or suspected MEC will follow the procedures discussed in paragraph 5-10.

a. The UXO team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 5-6.

b. The UXO team must visually survey the surface of each proposed surface soil sampling site for any indication of MEC or MC impact. In addition, the UXO team must conduct a survey of the proposed sampling locations using geophysical instruments capable of detecting the smallest known or anticipated military munition to a depth of 1 foot. The various types of geophysical detection instruments are discussed in Chapter 4.

c. If anomalies are detected at a proposed sampling location or too many anomalies are detected in a general area of interest, the HTRW personnel will select an alternate location for collection of surface soil samples. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance during HTRW sampling activities.

5-8. Passive Soil Gas Sampling. Passive soil gas sampling typically involves excavation of holes (1-inch to 1½-inches in diameter) to a depth of less than 5 feet and the installation and subsequent removal of sampling devices (typically 24-inch-long by ½-inch-inside-diameter tubes). The following paragraphs describe anomaly avoidance procedures for passive soil gas sampling on an HTRW site with known or suspected MEC.

a. The UXO team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 5-6.

b. The UXO team must visually survey the surface of the proposed passive soil gas sampling sites for any indication of MEC or MC impact. In addition, the UXO team must conduct a survey of the proposed sampling locations using geophysical instruments capable of detecting the smallest known or anticipated military munition to the specified emplacement depth for the sampling canister.

c. Utilities will be cleared and dig permits will be obtained in accordance with the procedures outlined in paragraph 5-4c.

d. If the emplacement depth is greater than the geophysical instrument's detection capabilities, then the UXO team must incrementally complete the geophysical survey every 12 inches while excavating for emplacement of the sampling canisters. While the UXO team is completing their geophysical survey remaining project personnel must withdraw out of the immediate area.

e. If anomalies are detected at a proposed sampling location or too many anomalies are detected in a general area of interest, the HTRW personnel will select an alternate location for collection of passive soil gas samples. If an anomaly is detected during an incremental geophysical survey, the hole will be backfilled in accordance with site-specific procedures. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance.

f. Unless a path is clearly marked, the HTRW sampling personnel must be escorted by a UXO-qualified person when they subsequently return to each soil gas sampling site to retrieve the sampling canisters.

5-9. Active Soil Gas Sampling and Direct Push Technology (DPT). Active soil gas sampling typically involves manual or mechanical penetration at the desired location followed by withdrawal and collection of a soil gas sample. DPT is a common method for mechanical

penetration during active soil gas sampling. The following paragraphs describe anomaly avoidance procedures for active soil gas sampling and use of DPT on an HTRW site with known or suspected MEC.

a. The UXO team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 5-6.

b. Active soil gas sampling and DPT installations will follow the same anomaly avoidance procedures outlined below for soil boring and monitoring well installations. The actual sampling will occur through the pilot hole or a boring located within a 2-foot radius of the pilot hole installed by the UXO team. If the pilot hole cannot be used to obtain a representative soil gas sample, it must be backfilled in accordance with site-specific procedures prior to the installation and sampling of the soil gas sampling point. The backfilling of the pilot hole will be performed to prevent the soil gas sampling from being diluted by atmospheric air that may be drawn in through the pilot hole. Following collection of the soil gas sample, the sampling location must be backfilled in accordance with site-specific procedures.

5-10. Subsurface Soil Sampling and Monitoring Well Installation. Subsurface soil sampling is defined as the collection of samples below a nominal depth of approximately 6 inches by means of a split-spoon, Shelby tube, or bucket auger soil sampler using drilling techniques. Drilling techniques are also used to install groundwater monitoring wells for HTRW investigative sampling. The following paragraphs describe anomaly avoidance procedures for subsurface soil sampling and monitoring well installations on an HTRW site with known or suspected MEC.

a. The UXO team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site, as described in paragraph 5-6.

b. Utilities will be cleared and dig permits will be obtained in accordance with the procedure outlined in paragraph 5-4c.

c. The UXO team must complete a subsurface geophysical survey of the proposed drill hole location(s). If an anomaly is detected, HTRW sampling personnel must select a new drill hole location. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance. If the subsurface sampling or well installation depth is greater than

the geophysical instrument's detection capabilities, the UXO team must incrementally complete the geophysical survey as outlined below.

(1) Pilot Hole/Incremental Geophysical Survey. Once an access survey has been completed, the UXO team will install a pilot hole at each proposed drill hole location. While the UXO team is completing their geophysical survey remaining project personnel must withdraw out of the immediate area.

(a) If an anomaly is detected, the pilot hole will be backfilled in accordance with site-specific procedures and HTRW sampling personnel must select a new drill hole location. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance.

(b) As long as no anomalies are detected, the pilot hole will be advanced to the maximum reach of the auger or to the maximum depth of the proposed drill hole, whichever is less. During the excavation of the pilot hole the drill rig's auger will be withdrawn and the hole checked for anomalies every 12 inches. The pilot hole will also be inspected upon reaching the final depth, providing a total clearance depth equal to the pilot hole depth plus 12 inches. If no anomalies are detected to the total depth of the proposed drill hole, the drill rig may be brought on-site and utilized.

(c) In cases where the pilot hole does not reach the full depth of the proposed boring (e.g., the proposed depth of the drill hole is more than the maximum depth of the auger, or the UXO team cannot penetrate the soils using the auger), the drill rig may be brought on-site and advanced in 12-inch increments beyond the clearance depth of the pilot hole. At the end of each 12-inch increment, the drill rig's auger must be withdrawn from the hole so that the UXO team may screen for anomalies as described above. As necessary with loose soils, a polyvinyl chloride (PVC) pipe (minimum 3 inches inner diameter) will be inserted to keep the hole open and to allow for incremental geophysical screening.

(d) When working in impact areas, the UXO team may discontinue incremental screening once the drilling has extended to depths of 30 feet below ground surface, the depth of penetration of the MEC has been exceeded, or the planned depth of drilling has been reached, whichever is less.

(e) For all other areas, incremental screening will be determined based on an assessment of the site's characteristics and history.

(2) Monitoring of Drilling by Others. Once the UXO team determines that a proposed drill hole location is free of anomalies, using the procedures described above, the drilling contractor shall be notified that the site is available for subsurface sampling or monitoring well installation.

(a) The drilling contractor's actual drill hole must be located within a 2-foot radius of the pilot hole installed by the UXO team. While this proximity to the pilot hole may affect the accuracy of "blow counts" for the HTRW team, anomaly avoidance takes precedence.

(b) Any drilling beyond the clearance depth of the pilot hole will be conducted in 12-inch increments to allow the UXO team to screen for anomalies. In order to avoid magnetic interference from the augers, the drill rig must withdraw its augers from the hole for the geophysical survey. As necessary with loose soils, a PVC pipe (minimum 3 inches inner diameter) may be inserted to keep the hole open and to allow for incremental geophysical screening. Drilling equipment and/or metallic support materials (e.g., drill rig, augers, drill rods, casings, etc.) may create an interference affecting the operation of the geophysical survey instrument during the incremental inspection process. In such an event, the item(s) creating the interference must be relocated outside the interference range of the geophysical instrument during each incremental inspection of the drill hole. If an anomaly is detected, the drill hole will be backfilled in accordance with site-specific procedures and HTRW sampling personnel must select a new drill hole location.

(c) When working in impact areas, the UXO team may discontinue incremental screening once the drilling has extended to a depth of 30 feet below ground surface, the depth of penetration of the MEC has been exceeded, or the planned depth of drilling has been reached, whichever is less.

(d) For all other areas, incremental screening will be determined based on an assessment of the site's characteristics and history.

5-11. Test Pit and Trench Excavations. Test pits and trench excavations are used to identify and characterize large subsurface HTRW areas of concern. The following paragraphs describe anomaly avoidance procedures for test pit and trench excavations on an HTRW site with known or suspected MEC.

a. The UXO team must conduct an access survey of the routes to and from the proposed investigation site as well as an area around the investigation site as described in paragraph 5-6.

b. The UXO team must complete a subsurface geophysical survey of the proposed excavation locations. If an anomaly is detected, HTRW sampling personnel must select a new excavation location. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance. If the proposed excavation depth is greater than the geophysical instrument's detection capabilities, the UXO team must incrementally complete the geophysical survey as outlined below.

(1) Underground Utilities. The procedures outlined in paragraph 5-4c will be followed.

(2) Excavation Procedures. Once an access survey has been completed, HTRW personnel may begin excavation in 1-foot increments. While the UXO team is completing their geophysical survey remaining project personnel must withdraw out of the immediate area.

(a) At the end of each 1-foot increment, the UXO team will screen for anomalies. If an anomaly is detected, HTRW sampling personnel must modify the excavation location to avoid the anomaly. Any anomalies detected will be prominently marked with survey flagging or pin flags for avoidance.

(b) If MEC is uncovered in an excavation, all operations will cease. The UXO team will assess the condition of the MEC to determine if disposal action is required. MEC disposition will follow the procedures discussed in paragraph 5-13. Once MEC has been encountered in an excavation, no further excavation is allowed at that location until EOD has removed the MEC. Once the MEC is removed, excavation using anomaly avoidance techniques may continue. If munitions with unknown fillers are discovered refer to the procedures identified in Chapter 7. The After Action Report will indicate that MEC was encountered and summarize the resulting activities.

c. Waste and/or Other Materials Encountered. In the event that potentially hazardous waste, debris, or drums are encountered during test pit or trenching operations, excavation activities will cease. The HTRW Site Safety and Health Officer (SSHO) will assess the situation and may direct a change to the PPE for site workers. The SSHO will notify the appropriate personnel in accordance with the site-specific Work Plan. Wastes will be handled in accordance with the site-specific IDW Management Plan.

5-12. Groundwater Monitoring/Aquifer Characterization. Groundwater monitoring activities include measurement of groundwater elevations, measurement of free product thickness, and collection of analytical samples. Groundwater monitoring wells may also be used for aquifer

characterization activities (e.g., slug tests). Unless a path is clearly marked, the HTRW sampling personnel must be escorted by UXO-qualified personnel, as described in paragraph 5-6a, when they subsequently return to conduct groundwater monitoring/aquifer characterization activities.

5-13. MEC Disposition. Since the purpose of MEC support during HTRW activities is anomaly avoidance, the UXO team is not tasked to perform MEC disposition. MEC disposition will not be covered in the planning documents for the project, and, therefore, the UXO team is not capable of or equipped to perform MEC disposition. In the event that MEC is encountered that cannot be avoided or, based on its fuzing or current condition, presents an imminent hazard requiring immediate attention, the UXO team will notify the local POC designated in the Work Plan. The UXO team will not destroy any of the MEC encountered. The local POC will notify the appropriate authority of the MEC discovery and the UXO team will safeguard the site pending arrival of the appropriate authority.

a. On active installations, MEC disposition requests will normally require reporting to the Range Control Officer, Facility Engineer, Post Headquarters, or POC designated in the Work Plan.

b. On FUDS, the local POC will facilitate the EOD response. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The local POC will also contact the MM CX.

5-14. Quality Management. HTRW Design Districts will include anomaly avoidance capability in all applicable indefinite delivery order contracts for HTRW reports, designs, or remedial actions on FUDS or active military sites. MEC concerns must be addressed before initiating any HTRW field investigation activities. Prior to initiation of on-site activities, items developed for MEC support of HTRW activities (i.e., SOW and Work Plan) must be submitted to the appropriate MM DC and the MM CX for review in accordance with the roles and responsibilities set forth in Chapter 1. The executing district is responsible for supervising the fieldwork and ensuring compliance with all approved plans by all USACE and contractor personnel. The MM CX may also conduct random inspections to verify conformance. A separate on-site, full-time UXO Quality Control Specialist (UXOQCS) is not required for MEC avoidance activities. However, the MEC support contractor shall perform QC reviews of its MEC-related field activities. Upon completion of the MEC support activities, the PM will ensure that an After Action Report is submitted to the MM CX.

CHAPTER 6

MEC Support during Construction Activities

6-1. Introduction.

a. This chapter discusses procedures for MEC support during construction activities (including construction activities related to remedial actions) on sites with known or suspected MEC. The purpose of MEC support during construction activities is to reduce the potential for exposure to MEC.

b. MEC support during construction activities may require only MEC standby support or subsurface removal, depending on an assessment of the probability of encountering MEC and the level of confidence associated with the determination.

(1) If the probability of encountering MEC is low (e.g., current or previous land use leads to an initial determination that MEC may be present), only MEC standby support will be required. MEC standby support is discussed in paragraph 6-6 below.

(2) When a determination is made that the probability of encountering MEC is moderate to high (e.g., current or previous land use leads to a determination that MEC was employed or disposed of in the area of concern), UXO-qualified personnel must conduct a subsurface removal of the known construction footprint and remove all discovered MEC.

(3) The level of effort for construction support is site/task-specific and will be determined on a case-by-case basis by the PDT in coordination with the MM CX.

c. When a determination is made that the probability of encountering MEC on a construction site is moderate to high (i.e., a subsurface removal of the known construction footprint will be conducted), an OE Safety Specialist will be on-site to provide safety oversight. When a determination is made that the probability of encountering MEC on a construction site is low (i.e., only MEC standby support is required), an OE Safety Specialist is generally not required on-site.

6-2. UXO Team Composition.

a. General. For construction activities on sites with known or suspected MEC, the contractor shall provide a UXO team consisting of a minimum of two UXO-qualified

personnel (one UXO Technician III and one UXO Technician II). The UXO team may include additional UXO-qualified personnel, depending on site- and task-specific conditions/requirements. The number of UXO teams will vary depending upon the total level of effort. Qualifications for contractor UXO personnel are discussed in EP 1110-1-18.

b. If subsurface removal is required in support of construction activities (i.e., there is a moderate to high probability of encountering MEC), the UXO team(s) must also meet the following standards:

(1) Each UXO team will not include more than six team members in addition to the UXO Technician III. The UXO Technician III will supervise all MEC operations and all personnel assigned to his/her team.

(2) A SUXOS will be on-site and will not supervise more than 10 UXO Technician IIIs. There will not be more than one SUXOS per project without prior approval from the Contracting Officer.

(3) The position of UXOSO will be required on all subsurface removal projects in support of construction activities; however, the positions of UXOSO and UXOQCS may be dual-hatted when there are less than 15 personnel on-site.

(4) A UXOQCS may not be required full-time on-site. However, QC functions will be performed for all field activities.

6-3. Planning.

a. The MEC support contractor shall prepare a Work Plan and ESS (if required) to supplement the construction contractor's or USACE's Work Plan/Site Plan as described in Chapter 3.

b. The UXO team will review any archival information available regarding the area of the proposed construction activities. If possible, the UXO team will determine the probable types of MEC that may be encountered and identify specific safety considerations.

6-4. Responsibilities. The UXO team members have the following responsibilities for MEC support during construction on a site with known or suspected MEC:

a. Provide the MEC recognition, location, and safety functions for the prime contractor during HTRW sampling activities.

b. Conduct MEC safety briefings for all site personnel and visitors.

6-5. Authority. The OE Safety Specialist has final on-site authority on MEC procedures and safety issues. If an OE Safety Specialist is not present on-site, the UXOSO, or if a UXOSO is not assigned to the site, the senior UXO-qualified person has final on-site authority for MEC procedures and safety issues.

6-6. Standby Support.

a. Standby support is required for construction activities on sites with known or suspected MEC if the probability of encountering MEC is low.

b. The UXO team will meet with on-site management and construction personnel and conduct a general work and safety briefing, including:

(1) Probable site hazards and site-specific safety considerations.

(2) MEC standby support procedures.

(3) Responsibilities and lines of authority for any MEC response.

(4) Emergency response procedures.

c. The UXO team will physically preview the actual construction footprint with the on-site management of the construction contractor and discuss visual observations and potential areas of concern. In the event that surface MEC is discovered, the UXO team will place flagging adjacent to the discovery for subsequent visual reference, select a course around the item, and lead any on-site personnel out of the area. The UXO team will assess the condition of the MEC to determine if a disposal action is required. If MEC is found on the surface, the PDT will perform a detailed assessment of the site to determine if the potential for encountering MEC is still low. If the potential for encountering MEC is raised to moderate to high, a subsurface removal for the construction footprint will be required. Refer to paragraph 6-7 for subsurface removal requirements.

d. The UXO team will monitor all excavation activities in areas known or suspected to contain MEC. One member of the team will be positioned to the rear and upwind of the excavation equipment for continuous visual observation of activities. If the construction contractor unearths or otherwise encounters a military munition with an unknown filler, all excavation activities will cease. The UXO team will assess the condition of the military

munition to determine if a disposal action is required. Once MEC has been encountered in an excavation, no further excavation will be allowed at that location until EOD has removed the MEC. Excavation will not continue until a detailed assessment of the potential of encountering additional MEC is completed. If the PDT determines that the item was an anomaly and no other MEC are expected, then the excavation may continue. If the PDT determines through the available data that the probability of encountering additional MEC is moderate to high, then a subsurface removal of the construction footprint is required. Refer to paragraph 6-7 for subsurface removal requirements. The After Action Report will indicate that MEC was encountered and will summarize the resulting activities.

e. The UXO team is generally not tasked to perform MEC disposition activities during standby support of construction activities. If MEC that requires disposal is encountered, the procedures outlined in paragraph 5-13 of this pamphlet will be followed.

6-7. Subsurface Removal in Support of Construction Activities.

a. A subsurface removal of the identified construction footprint is required when the probability of encountering MEC during construction-related excavation activities is moderate to high.

b. A subsurface removal requires close coordination among the on-site USACE management personnel, the construction contractor, and the MEC support contractor.

c. A surface removal may be required to remove any existing MEC from the surface of the work area prior to proceeding with subsurface removal activities. All military munitions debris, target materials, and non-MEC-related materials, which may interfere with a subsurface geophysical survey, will also be removed from the surface of the work area and staged for later disposition. The UXO team will perform surface removal activities.

d. Safety Considerations.

(1) Subsurface removal actions must be accomplished in strict accordance with the approved Work Plan, including all subplans (e.g., APP/SSHP, ESP, and ESS, if required) and appendices. Prior to commencing subsurface removal activities, the UXO team will provide a general work and safety briefing to all on-site personnel. This briefing will address the following:

(a) Probable site hazards and site-specific safety considerations.

(b) Responsibilities and lines of authority for any military munitions response to MEC.

(c) Emergency response procedures.

(2) Utility clearance and/or excavation permits, if required, must be obtained prior to the commencement of any intrusive activities near underground utilities. The UXO team is responsible for verifying that all necessary excavation permits are on-site prior to commencing operations. The construction contractor is responsible for contacting the appropriate agency(ies) or company(ies) to mark the location of all subsurface utilities in the construction area. All located utilities will be marked by paint, pin flags, or other appropriate means to visually delineate their approximate subsurface routing. The color will not conflict with the colors used in MEC activities. In the event that subsurface utilities are suspected in an excavation area, the UXO team must attempt to verify their location. The UXO team must be aware that not all utility lines will be detectable with geophysical equipment (i.e., not all utility lines are constructed of ferrous material).

(3) MSDs must be established in accordance with Chapter 3 for all MEC procedures (i.e., anomaly excavation, access and identification of MEC, MEC recovery, and MEC destruction). During these operations, non-essential personnel will withdraw to the MSD of the MGFD involved.

e. Area Preparation.

(1) Area preparation includes reduction and/or removal of vegetation that may impede or limit the effectiveness of subsurface removal actions. Vegetation reduction/removal may be accomplished through manual removal, mechanical removal, controlled burning, or defoliation. Selection of the appropriate land clearing strategy will be based on the type, fuzing and concentration of MEC; type and concentration of vegetation; topography; drainage patterns; terrain and soil conditions; and the level of required environmental and natural resource protection.

(2) Area preparation is not considered a MEC procedure. The UXO escort and anomaly avoidance procedures for access surveys presented in paragraph 5-6 of this pamphlet will be followed.

f. Geophysical Mapping/Analysis.

(1) A subsurface geophysical survey will be conducted to identify and locate all anomalies in the identified construction footprint. The various types of geophysical detection

instruments are discussed in Chapter 4. Subsurface geophysical surveys may be completed using detection instruments with real time or post-processing identification and discrimination techniques. All anomalies will be prominently marked with survey flagging or pin flags for subsequent intrusive investigation.

(2) Subsurface geophysical surveys are not considered a MEC procedure. The UXO escort and anomaly avoidance procedures for access surveys presented in paragraph 5-6 of this pamphlet will be followed.

(3) After the dig list is developed, the selected anomalies will be reacquired in accordance with the Geophysical Investigation Plan.

g. Anomaly Excavation.

(1) Anomaly excavation operations are required to intrusively investigate and identify the source of all anomalies located during the geophysical survey. During excavation operations, only essential project personnel may be within the exclusion zone. All anomaly excavation operations will comply with the provisions of 29 CFR 1926, Subpart P.

(2) UXO-qualified personnel will manually complete anomaly excavations of less than 1 foot. If an anomaly is deeper than 1 foot, earth-moving machinery (EMM) may be used to assist in excavation efforts unless site constraints or accessibility restrict or prohibit such use. EMM will not be used to excavate within 12 inches of an anomaly. When an anomaly excavation gets within approximately 12 inches of an anomaly, manual excavation must be used to complete the excavation.

(3) Only UXO-qualified members of a UXO team may conduct manual excavation operations. A non-UXO-qualified member of the UXO team may operate EMM used to assist in anomaly excavations. If more than one EMM will be used within the same work area, the TSDs described in Chapter 9 of EM 1110-1-4009 will apply to the EMMs.

(4) After the probable source of the anomaly is identified and removed, an approved geophysical instrument will be used to validate the process. If the geophysical instrument does not continue to detect an anomaly, then the excavation may be backfilled and restored in accordance with contract requirements.

6-8. MEC Destruction.

a. The Work Plan will include procedures for destruction of MEC recovered during construction activities. Destruction of recovered MEC can take one of three forms: in-place, on-site, or off-site. The decision regarding which technique to use is based on the risk involved in employing the disposal operation based on site-specific characteristics and the nature of the MEC recovered as determined by the UXO team. Additional information on MEC disposal operations can be found in TM 60A-1-1-31.

(1) In-Place Destruction. In-place destruction (blow-in-place) is a technique used when it is determined that moving the MEC to an alternate location for destruction is not acceptable. This technique is preferred because it exposes the minimum number of personnel. All in-place destructions will be conducted in a manner that ensures maximum control of the site. When this technique is employed, engineering controls may be used to minimize the blast effects.

(2) On-Site Destruction. If MEC is recovered in close proximity to occupied buildings, it may not be possible to safely destroy the item in-place. In this instance, the item may be moved to a part of the project site where destruction and disposal can safely take place. When a MEC is destroyed on-site, engineering controls may be used to minimize the blast effect, as well as to minimize residual contamination. Guidance for the on-site destruction of MEC is found in EP 1110-1-17.

(3) Off-Site Destruction. If transported off-site for destruction, MEC will be transported by either military vehicles or by a qualified UXO contractor. MEC is typically transported to an active military installation where it can be safely destroyed. Off-site transportation will be conducted in accordance with EP 385-1-95a and EP 1110-1-18. All UXO must be certified for shipment in accordance with paragraph 1-9 of TB 700-2. Paragraph 6-8c below provides additional information on transportation of MEC.

b. Safety. The following safety considerations for MEC destruction will be addressed in the Work Plan.

(1) The UXO team conducting MEC destruction activities will consist of at least three personnel, with a minimum of two UXO-qualified personnel, one UXO Technician III and one UXO Technician II. One member of the UXO team must always be located outside the MSD for intentional detonations to give warning and assist in rescue activities in the event of an accident.

(2) Explosives or accessory equipment that is obviously deteriorated or damaged will not be used.

(3) Blasting caps will be at least a commercial No. 8 or equivalent and, for destruction activities requiring multiple caps, be from the same manufacturer.

(4) Blasting caps must be transported in approved containers and not be exposed to direct sunlight.

(5) The explosive end of blasting caps, detonators, and explosive devices will be pointed away from the body during handling.

(6) Blasting caps will not be buried. Detonating cord will be used to position blasting caps above the ground.

(7) Electric blasting caps must be tested for continuity prior to connecting them to the firing circuit. Upon completion of testing, the lead wires will be short-circuited by twisting the bare ends of the wires together.

(8) In the event of an electric misfire or non-detonation, the MEC destruction site must not be approached for at least 30 minutes. For non-electric procedures wait 1 hour after the maximum delay predicted for any part of the disposal shot has passed before starting to investigate. A post-search of the detonation site must be conducted to ensure complete MEC destruction and to ensure that no fires have started.

c. Transport.

(1) Existing site conditions may require that MEC that has been certified as acceptable-to-ship in accordance with TB 700-2 be transported to a designated MEC destruction location either on or off the project site.

(2) A Transportation Plan detailing the route and procedures to be used to transport the MEC must be prepared and accepted prior to engaging in any transport activities to ensure that all safety aspects of the movement have been addressed. The transport of MEC off-site must be performed in accordance with the provisions of EP 385-1-95a, EP 1110-1-18, and applicable state and local laws. Contractor personnel who, by contract requirement, are tasked with the responsibility of transporting or preparing shipments of MEC for transport over public roads must meet all training requirements of 49 CFR Part 172 and applicable state requirements.

(3) Safety. MEC will be transported from the discovery location to an alternate destruction location only as a last resort. Transportation of MEC will be in accordance with paragraph 1-9 of TB 700-2. Armed fuzes must be transported only when absolutely necessary and when all other avenues for in-place disposal have been exhausted. Safety considerations for the transport of MEC include the following:

(a) MEC packaging designs must provide a container with appropriate blocking and bracing to prevent migration of the hazardous filler. Padding will also be added to protect any exposed filler from heat, shock, and friction.

(b) Base-ejection-type projectiles must be transported with the base oriented to the rear of the vehicle and the projectile secured.

(c) Incendiary loaded munitions will be placed on a bed of sand and covered with sand.

(d) Loose pyrotechnic, tracer, flare, and similar mixtures will be placed in No.10 mineral oil or equivalent.

(e) White phosphorus-filled munitions will be immersed in water, mud, or wet sand.

(4) Manifest. A manifest will be prepared in accordance with 49 CFR 172.205 and 40 CFR 262.20 when transporting MEC over public roads in non-emergency situations. In emergency situations, military EOD personnel will respond. For the purposes of transportation and storage, MEC will be hazard classified in accordance with TB 700-2. Government personnel who are tasked to sign shipping papers must be trained and be given signature authority by their agency in accordance with the requirements of DOD 4500.9-R.

d. Explosives Management.

(1) If explosives will be required for the destruction of MEC, then an Explosives Management Plan will be prepared as part of the Work Plan. The Explosives Management Plan will be used to provide details on the management of explosives for a specific project in accordance with applicable regulations. The plan will include information on Acquisition, Initial Receipt, Storage, Transportation, Receipt Procedures Inventory, Unaccounted for UXO/Unauthorized Use of Explosives, and other areas.

(2) Explosives used for the destruction of MEC must be acquired and managed in accordance with applicable Federal, state, and local laws and regulations including, but not limited to, the following:

(a) ATFP 5400.7 and 27 CFR.

(b) DOD 6055.9-STD.

(c) 49 CFR.

(d) 29 CFR 1910 and 1926.

(e) FAR 45.5.

(3) Acquisition. Explosives may be purchased only under a license issued by the ATF. The license holder must provide written authorization designating the individual(s) authorized to purchase, store, or utilize explosives. This letter must specify the name, home address, date and place of birth, and the social security number of the designated individual(s). A copy of the letter must be maintained at the project office. In addition, the designated individual purchasing explosives may also be required to have a Blaster's License issued by the state in which the project is located. Explosives must be purchased from an ATF-licensed commercial distributor. The license holder must provide the distributor a certified statement of the intended use of the explosive material.

e. Temporary Explosives Storage Facilities on FUDS.

(1) When the contractor establishes a temporary storage area for explosives on a FUDS site, Type 2 magazines conforming to the standards set forth in Section 55.208 of ATF P 5400.7 must be used. The location of the proposed magazines and the Q-D arcs must be shown on a site map attached to the ESP. The Q-D arcs must be based on the NEW established for each magazine using the appropriate tables in DOD 6055.9-STD. In the event that existing site conditions prohibit the siting of the magazines in conformance with derived Q-D arcs and the NEW cannot be reduced to achieve conformance, the PM must request assistance in the design of engineering controls or structural modifications necessary to bring the magazine within the stated Q-D criteria.

(2) Explosives and initiators must be stored separately. If magazines are also used to temporarily store acceptable-to-ship MEC, each MEC must be stored in accordance with its appropriate HD and the storage compatibility group criteria listed in Chapter 3 of DOD 6055.9-STD. Each magazine must display the placards required by Department of Transportation regulations 49 CFR Part 172, Subpart F, for the HD of the MEC or explosives stored in the magazine.

(3) Lightning protection is not required for magazines located on FUDS if all of the following criteria are met:

(a) The magazine is constructed of 3/16-inch-thick steel or greater.

(b) The magazine is properly grounded.

(c) The magazine is located at least 6 and 1/2 feet from the nearest fence or any other magazine.

f. Temporary Storage Facilities on Base Realignment and Closure (BRAC) Sites/Active Installations.

(1) Temporary storage facilities for projects on BRAC sites or active installations must be determined using the installation's criteria.

(2) Lightning protection for temporary explosives storage facilities to be located on BRAC sites or active installations must meet the provisions of Chapter 7 of DOD 6055.9-STD.

g. Security.

(1) The Work Plan will describe the inventory control system to be implemented for explosives management. Magazine Data Cards documenting explosives transfers for each magazine must be completed with a copy maintained within the associated magazine. Explosives issued and unexpended must be returned to the magazine at the end of each workday.

(2) The inventory control system must include provisions for the physical inventory of the stored MEC and explosives at least weekly. Actual quantities must be reconciled with the quantities annotated on the corresponding Magazine Data Cards. Any discrepancies must be immediately reported to the USACE representative and an audit initiated to determine the source of the discrepancy.

(3) A physical security survey will be conducted in accordance with AR 190-11 to determine if fencing or guards are required when temporary storage facilities are used. Generally, a fence around the magazines is needed, but the contractor is responsible for determining the degree of protection required to deter the theft of MEC or explosives stored in the magazines.

(4) Locks used on magazines at a FUDS will meet the standards listed in Section 55.208 (a) (4), ATF P 5400.7. BRAC and Installation Restoration site requirements must be determined using the installation's criteria. A key control system will be documented in the Work Plan.

h. Fire Prevention. A Fire Prevention Plan will be prepared and coordinated with the fire department with primary response responsibility. Fire extinguishers of an appropriate size and type must be located at all temporary explosives storage facilities.

i. Records. Records must be maintained for all transactions and expenditures of explosive materials for a period of five years from the date of transaction in accordance with ATF regulations. These records must be maintained at the project office during on-site operations and subsequently at the business office of the ATF license holder.

j. Munitions Debris Management. The Work Plan must include operational and QC procedures for the processing, demilitarization, and disposition of inert ordnance, range-related debris, and munitions debris that fall within the classification of Material Potentially Presenting an Explosive Hazard (MPPEH). Contact the MM CX for the requirements on MPPEH processing and disposition.

6-9. Quality Management.

a. QC.

(1) The UXO team is responsible for the QC of all surface and subsurface removal activities and for ensuring that only those procedures and processes conforming to contractual requirements and accepted project plans are implemented. The UXO team will develop a Quality Control Plan (QCP) outlining the quality activities to be used for continually assessing the implementation, effectiveness, compliance, and adequacy of operations.

(2) A separate UXOQCS is not required on-site full-time for MEC support activities. However, the MEC support contractor shall perform QC reviews of all field activities in accordance with the accepted QCP.

(3) The QCP will provide procedures for validation of the following:

(a) Surface removal and related activities are conducted in accordance with accepted project plans.

(b) Subsurface removal and related activities are conducted in accordance with accepted project plans.

(c) Actual probabilities of detection are consistent with removal reliability levels and USACE and DDESB requirements.

(d) Subsurface removal operations provide for an adequate level of confidence of MEC detection and removal to specified depths.

(e) Disposition of MEC and materials classified as MPPEH has been completed and documented. Procedures are available from the MM CX.

b. Quality Assurance.

(1) Districts should include MEC support capabilities in all applicable contracts for construction activities on FUDS or active military sites. MEC concerns must be addressed before initiating any construction activities. Items developed for MEC support of construction activities (i.e., SOW, Work Plan, APP/SSHP, ESP, and ESS, if required) must be submitted to the MM CX for review and approval in accordance with the roles and responsibilities set forth in Chapter 1 of this pamphlet prior to initiation of on-site activities.

(2) The district is responsible for supervising the fieldwork and ensuring contractor compliance with all accepted plans. The MM CX may also conduct random inspections to verify conformance. Upon completion of the MEC support activities, the PM will ensure that an After Action Report is submitted to the MM CX.

CHAPTER 7

Procedures When RCWM is Encountered

7-1. Introduction.

a. This chapter discusses MEC support procedures to be followed in the event that RCWM or munitions with unknown fillers are encountered on a project site. Detailed procedures for planning and executing RCWM response actions are located in EP 75-1-3.

b. An item configured as a military munition containing a chemical substance that is intended to kill, seriously injure, or incapacitate a person through its physiological effects is considered Chemical Warfare Materiel (CWM). CWM also includes V- and G- series nerve agent, H- series blister agent, and lewisite in other-than-munition configurations. Due to their hazards, prevalence, and military-unique application, chemical agent identification sets are also considered to be CWM. CWM does not include riot control agents, chemical herbicides, smoke and flame producing items, or soil, water, debris, or other media contaminated with chemical agent. Non-stockpile CWM that was previously discarded, buried, or fired and discovered either unexpectedly or during planned environmental restoration operations is referred to as RCWM.

c. Soil, water, debris, and other media contaminated with chemical agent are not considered to be RCWM. The procedures described in ER 1110-1-8153 will be followed when only agent-contaminated media are suspected.

7-2. Response Procedures.

a. Any time that RCWM or munitions with unknown fillers are encountered during MEC support, all work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area to prevent unauthorized access. Personnel will position themselves as far upwind as possible while still maintaining the security of the area.

b. Notification.

(1) When RCWM or munitions with unknown fillers are identified on FUDS project sites, the UXO team will notify the local POC designated in the Work Plan. The local POC will facilitate the EOD unit's response and two personnel will secure the site until the EOD

unit's arrival. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The EOD unit will notify the U.S. Army Technical Escort Unit (TEU) and secure the area until TEU's arrival. After notifying the local law enforcement agencies, the local POC will notify the USAESCH Chemical Warfare Design Center to inform them of the actions taken.

(2) On active installations, the UXO team will normally notify the Range Control Officer, the Facility Engineer, Post Headquarters, or the POC designated in the Work Plan.

c. Reporting. Chemical event reports must be submitted in accordance with AR 50-6. Specific reporting requirements are identified in EP 75-1-3.

GLOSSARY

Section I
Acronyms

ANSI.....American National Standards Institute
APP.....Accident Prevention Plan
AR.....Army Regulation
ATF.....Bureau of Alcohol, Tobacco, and Firearms
ATF P .....Bureau of Alcohol, Tobacco, and Firearms Publication
BRAC .....Base Realignment and Closure
CERCLA .....Comprehensive Environmental Response, Compensation, and Liability Act
CFR.....Code of Federal Regulations
CPR.....Cardiopulmonary Resuscitation
CWM .....Chemical Warfare Materiel
CX.....Center of Expertise
DA .....Department of the Army
DDESB .....Department of Defense Explosives Safety Board
DOD .....Department of Defense
DOT.....Department of Transportation
DPT.....Direct Push Technology
EED .....Electro-explosive Device
EM .....Electromagnetic
EM .....Engineer Manual
EMM.....Earth-Moving Machinery
EMR .....Electromagnetic Radiation
EOD.....Explosives Ordnance Disposal
EP .....Engineer Pamphlet
ER.....Engineer Regulation
ESP .....Explosives Siting Plan
ESS .....Explosives Safety Submission
FDEM.....Frequency-Domain Electromagnetics
FUDS.....Formerly Used Defense Sites
GPO .....Geophysical Prove-Out
HD .....Hazard Division
HQUSACE .....Headquarters, U.S. Army Corps of Engineers

HTRW ..... Hazardous, Toxic, and Radioactive Waste
IDW ..... Investigative-Derived Waste
IGE ..... Independent Government Estimate
MC ..... Munitions Constituents
MCACES ..... Micro Computer-Aided Cost Engineering System
MEC ..... Munitions and Explosives of Concern
MGFD ..... Munition with the Greatest Fragmentation Distance
MM CX ..... Military Munitions Center of Expertise
MM DC ..... Military Munitions Design Center
MPPEH ..... Material Potentially Presenting an Explosives Hazard
MRA ..... Munitions Response Area
MSC ..... Major Subordinate Command
MSD ..... Minimum Separation Distance
NEW ..... Net Explosive Weight
OE ..... Ordnance and Explosives
PDT ..... Project Delivery Team
PL ..... Public Law
PM ..... Project Manager
POC ..... Point of Contact
PPE ..... Personal Protective Equipment
PVC ..... Polyvinyl Chloride
QC ..... Quality Control
Q-D ..... Quantity-Distance
QCP ..... Quality Control Plan
RCWM ..... Recovered Chemical Warfare Materiel
RF ..... Radio Frequency
SOW ..... Statement of Work
SSHO ..... Site Safety and Health Officer
SSHP ..... Site Safety and Health Plan
SUXOS ..... Senior UXO Supervisor
TB ..... Technical Bulletin
TDEM ..... Time-Domain Conductivity Electromagnetics
TEU ..... Technical Escort Unit
TM ..... Technical Manual
TSD ..... Team Separation Distance
USACE ..... U.S. Army Corps of Engineers
USAESCH ..... U.S. Army Engineering and Support Center, Huntsville
USASC ..... U.S. Army Safety Center

UXO ..... Unexploded Ordnance
UXOSO ..... UXO Safety Officer
UXOQCS..... UXO Quality Control Specialist

Section II
Terms

Action Memorandum
Approves time-critical removal action and also concludes the engineering evaluation/cost analysis. Provides a concise, written record of the decision to select an appropriate removal action. As the primary decision document, it substantiates the need for a removal action, identifies the proposed action, and explains the rationale for the removal action selected. (EP 1110-1-18)

Active Installations
Installations under the custody and control of DOD. Includes operating installations, installations in a standby or layaway status, and installations awaiting closure under the Base Realignment and Closure (BRAC) legislation. (EP 1110-1-18)

Active Range
A military range that is currently in service and is being regularly used for range activities. (40 CFR 266.201)

Anomaly
Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and non-ferrous material at a site (i.e., pipes, power lines, etc.). (EP 1110-1-18)

Anomaly Avoidance
Techniques employed by EOD or UXO personnel at sites with known or suspected MEC to avoid any potential surface MEC and any subsurface anomalies. This usually occurs at mixed hazard sites when HTRW investigations must occur prior to execution of a MEC removal action (i.e., creating safe travel lanes and work areas when HTRW investigations are to be performed prior to MEC removal). Intrusive anomaly investigation is not authorized during ordnance avoidance operations. (ER 1110-1-8153)

Base Realignment and Closure (BRAC)
Program governing the scheduled closing of Department of Defense sites. (Base Closure and Realignment Act of 1988, Public Law 100-526, 102 Stat. 2623, and the Defense Base Closure and Realignment Act of 1990, Public Law 101-510, 104 Stat. 1808)

Center of Expertise (CX)
A CX is a USACE organization approved by HQUSACE as having a unique or exceptional technical capability in a specialized subject area that is critical to other USACE commands. Specific mandatory services to be rendered by a CX are identified on the CX's homepage. These services may be reimbursable or centrally funded. The USAESCH is the MM CX for the USACE. (ER 1110-1-8153)

Chemical Warfare Materiel (CWM)
An item configured as a military munition containing a chemical substance that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. Also includes V- and G- series nerve agent, H- series blister agent, and lewisite in other- than-munition configurations. Due to their hazards, prevalence, and military-unique application, chemical agent identification sets (CAIS) are also considered CWM. CWM does not include: riot control agents, chemical herbicides; smoke and flame producing items; or soil, water, debris, or other media contaminated with chemical agent. (HQDA Memorandum, Interim Guidance for Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activities, 1997)

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
CERCLA authorizes Federal action to respond to the release or threatened release of hazardous substances into the environment or a release or threat of release of a pollutant or contaminant into the environment that may present an imminent or substantial danger to public health or welfare. (EP 1110-1-18)

Construction Support
Support provided by qualified UXO personnel during construction activities at potential MEC sites to ensure the safety of construction personnel from the harmful effects of UXO. When a determination is made that the probability of encountering UXO is low (e.g., current or previous land use leads to an initial determination that UXO may be present), a minimum of a two person UXO team will stand by in case the construction contractor encounters a suspected UXO with unknown fillers. When a determination is made that the probability of encountering a UXO is moderate to high (current or previous land use leads to a determination that MEC was employed or disposed of in the parcel of concern, e.g., open burn and open detonation areas), UXO teams are required to conduct subsurface UXO removal for the known construction footprint either in conjunction with the construction contractor or prior to construction. The level of effort will be determined on a case-by-case basis in coordination with the MM MCX. (ER 1110-1-8153)

Design Center (DC)
A specified USACE field office assigned a singular technical mission that is permanent and USACE-wide in scope. The designated office is to be considered the "lead activity" in a specialized area where capability needs to be concentrated for maximum effectiveness, economy, and efficiency. The MM Design Center (in coordination with the PM) will execute all phases of the military munitions response project after the approval of the INPR unless the removal action is transferred to an approved district. Only the USAESCH MM Design Center is authorized to execute any phase of a RCWM response. (ER 1110-1-8153)

Discarded Military Munitions (DMM)
Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Exclusion Zone
A safety zone established around a MEC work area. Only project personnel and authorized, escorted visitors are allowed within the exclusion zone. Examples of exclusion zones are safety zones around MEC intrusive activities and safety zones where MEC is intentionally detonated. For RCWM project sites, it is the area within the No Significant Effects (NOSE) zone.

Explosives or Munitions Emergency Response
All immediate response activities by an explosives and munitions emergency response specialist to control, mitigate, or eliminate the actual or potential threat encountered during an explosives or munitions emergency. An explosives or munitions emergency response may include in-place render-safe procedures, treatment or destruction of the explosives or munitions, and/or transporting those items to another location to be rendered safe, treated, or destroyed. Any reasonable delay in the completion of an explosives or munitions emergency response caused by a necessary, unforeseen, or uncontrollable circumstance will not terminate the explosives or munitions emergency. Explosives and munitions emergency responses can occur on either public or private lands and are not limited to responses at RCRA facilities. (Military Munitions Rule, 40 CFR 260.10)

Explosives Ordnance Disposal (EOD)
The detection, identification, field evaluation, rendering safe, recovery and final disposal of UXO or military munitions. (EP 1110-1-18)

EOD Personnel
Active duty military personnel who perform EOD operations.

Explosives Safety Submission (ESS)
The document which serves as the specifications for conducting work activities at the project. The ESS details the scope of the project, the planned work activities, and potential hazards (including the MCE) and the methods for their control. (EP 1110-1-18)

Formerly Used Defense Sites (FUDS)
FUDS include those properties previously owned, leased, or otherwise possessed by the U.S. and under the jurisdiction of the Secretary of Defense; or manufacturing facilities for which real property accountability rested with DOD but were operated by contractors (Government owned - contractor operated) and which were later legally disposed of. FUDS is a subprogram of the DERP. Restoration of military land was extended to formerly used sites in 1983 under Public Law 98-212 (DOD Appropriations Act of FY84).

Hazardous, Toxic, and Radioactive Waste (HTRW) Activities
HTRW activities include those activities undertaken for the Environmental Protection Agency's Superfund program, the Defense Environmental Restoration Program (DERP), including Formerly Used Defense Sites (FUDS) and Installation Restoration Program (IRP) sites at active DOD facilities, HTRW actions associated with Civil Works projects, and any other mission or non-mission work performed for others at HTRW sites. (EP 1110-1-18) For the purposes of UXO support, HTRW activities during the investigative/design phase of HTRW project on a site with known or UXO with unknown fillers require anomaly avoidance procedures. HTRW activities during the remedial action phase (construction) of HTRW project on a site with known or UXO with unknown fillers may require either standby support or subsurface removal.

Material Potentially Presenting an Explosive Hazard (MPPEH)
Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially contaminated with a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, ventilation ducts) associated with munitions production, demilitarization or disposal operations. Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not

munitions and are not intended for use as munitions. (28 October 2003 ACSIM Memorandum)

Military Munitions
All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, except that the term does include non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 2710(e)(3)(A))

Munitions Constituents (MC)
Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710 (e)(4))

Munitions and Explosives of Concern (MEC)
This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means:
(a) Unexploded Ordnance (UXO), as defined in 10 U.S.C. 2710 (e)(9);
(b) Discarded military munitions (DMM), as defined in 10 U.S.C. 2710 (e)(2); or
(c) Munitions constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard. (28 October 2003 ACSIM Memorandum)

Munitions Debris
Remnants of munitions (e.g., penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization or disposal. (28 October 2003 ACSIM Memorandum)

Munition with the Greatest Fragmentation Distance (MGFD)
The munition with the greatest fragment distance that might be recovered as a result of previous training during actions based on historical information. The selected MGFD must be realistic with reasonable probability of occurrence.

Munitions Response
Response actions, including investigation, removal and remedial actions to address the explosives safety, human health, or environmental risks presented by unexploded ordnance (UXO), discarded military munitions (DMM), or by munitions constituents (MC). (28 October 2003 ACSIM Memorandum)

Munitions Response Area (MRA)
Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites. (28 October 2003 ACSIM Memorandum)

Munitions Response Site (MRS)
A discrete location within a MRA that is known to require a military munitions response. (28 October 2003 ACSIM Memorandum)

OE Safety Specialist
USACE Personnel, classified as a GS-0018 Safety Specialist, and who is UXO-qualified. OE Safety Specialists perform safety, quality assurance and UXO subject matter expert functions for the Government. The Safety Specialist may reside in and report to the construction field office or may reside in the engineering/construction office within the MM Design Center. (ER 1110-1-8153)

Project Delivery Team (PDT)
The PDT is a multi-disciplined PDT led by the Project Manager with responsibility for assuring that the project stays focused, first and foremost on the public interest and on the customer's needs and expectations and that all work is integrated and done in accordance with a PMP and approved business and quality management processes. The PDT focuses on the quality of project delivery, with heavy reliance on partnering and relationship development to achieve better performance. (ER 5-1-11)

Project Manager (PM)
The PM is responsible for management and leadership of the project its entire life cycle, even when more than one USACE district or activity is involved. The PM will generally reside at the geographic district, but can be elsewhere as needed. The PM and PDT are responsible and accountable for ensuring the team takes effective, coordinated actions to deliver the completed project according to the PMP. The PM manages all project resources, information, and commitments, and leads and facilitates the PDT towards effective project development and execution. (ER 5-1-11)

Quality Assurance (QA)
An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed to meet project requirements defined in the PMP. (EP 1110-1-18)

Quality Control (QC)
The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established in the PMP: operational techniques and activities that are used to fulfill requirements for quality. (EP 1110-1-18)

Quantity-Distance (Q-D)
The quantity of explosive material and distance separation relationships that provide defined types of protection. These relationships are based on levels of risk considered acceptable for the stipulated exposures and are tabulated in the appropriate Q-D tables provided in DOD 6055.9-STD. Separation distances are not absolute safe distances but are relative protective safe distances. Greater distances than those shown in the Q-D tables shall be used whenever possible. (DOD 6055.9-STD)

Recovered Chemical Warfare Materiel (RCWM)
Non-stockpile CWM that was previously discarded, buried, or fired and discovered either unexpectedly or during planned environmental restoration operations. (ER 385-1-95)

Removal Action
The cleanup or removal of MEC from the environment to include the disposal of removed materiel. The term includes, in addition, without being limited to, security fencing or other measures to prevent, minimize, or mitigate damage to the public health or welfare or to the environment. (ER 1110-1-8153)

Resource Conservation and Recovery Act (RCRA)
Enacted in 1976, RCRA promotes the protection of health and the environment. It regulates waste generation, treatment, storage, transportation, and disposal for facilities currently in operation. The MEC removal process is affected by RCRA if MEC must be disposed off-site. (EP 1110-1-18)

Small Arms
Caliber 0.50 and smaller ordnance items. These items rarely contain explosive projectiles and present a very low hazard. (Huntsville Interim Guidance Document 99-02)

Stakeholder
Stakeholders include federal, state, and local officials, community organizations, property owners, and others having a personal interest or involvement, or having a monetary or commercial involvement in the FUDS property that is to undergo a MEC removal. (EP 1110-1-18)

Superfund Amendments and Reauthorization Act (SARA)
Enacted in 1986, this legislation establishes standards for cleanup activities, requires Federal facility compliance with CERCLA, and clarifies public involvement requirements. (EP 1110-1-18)

U.S. Army Technical Escort Unit (TEU)
Military chemical agent response unit.

Unexploded Ordnance (UXO)
Military munitions that:
(a) Have been primed, fuzed, armed, or otherwise prepared for action;
(b) Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and
(c) Remain unexploded either by malfunction, design, or any other cause. (10 U.S.C. 2710(e)(9))

UXO Personnel
Contractor personnel who have completed specialized military training in EOD methods and have satisfactorily performed the EOD function while serving in the military. Various grades and contract positions are established based on skills and experience. Check with the MM MCX for current ratings. (ER 1110-1-8153)

HEALTH AND SAFETY PLAN

CONSTRUCTION SUPPORT PLAN

FOR

MUNITIONS & EXPLOSIVES OF CONCERN (MEC) AVOIDANCE SERVICES

INSTALLATION RESTORATION PROGRAM (IRP) FOR SITE 19 OF ST. JULIENS CREEK ANNEX CHESAPEAKE, VA

CONTRACT NUMBER: CTO-0059

FEBRUARY 14, 2006

Prepared by:
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SITE SPECIFIC HEALTH AND SAFETY PLAN
MEC CONSTRUCTION SUPPORT
ST. JULIENS CREEK ANNEX
CHESAPEAKE, VIRGINIA

1.0 INTRODUCTION

EOTI strongly believes that our people are our most important and valuable asset. It is the actions of our personnel, working together as a team, which ultimately determines the success of our endeavors as a company. Accidental injuries and illnesses can cause needless pain and suffering of employees and their families, as well as increasing costs and decreasing productivity and morale among employees. EOTI is committed to providing a safe and healthful work environment for all of our employees in all locations. EOTI has never experienced a lost time accident. The company's goal is an accident-free work environment. The management of EOTI is committed to doing all in our power to make this a reality.

1.1 Safety and Health Expectations and Compliance.

All managers and supervisors are responsible for implementing the provisions of this HASP and for answering team member questions about accident prevention. Management is responsible for ensuring that all safety and health policies and procedures are clearly communicated and understood by all team members. Managers and supervisors are expected to enforce the rules fairly and uniformly. This will be accomplished by:

- Informing team members of the provisions of the Safety and Health Program;
- Evaluating the safety performance of all team members;
- Recognizing team members who perform safe and healthful work practices;
- Providing training to team members whose safety performance is deficient; and
- Disciplining team members for failure to comply with safe and healthful work practices.

All team members are responsible for using safe work practices, for following all directives, policies and procedures, and for assisting in maintaining a safe work environment EOTI recognizes that open, two-way communication between management and all team members on health and safety issues are essential to an injury-free, productive workplace. To facilitate a continuous flow of safety and health information between all team members that is readily understandable, the following will be accomplished:

- Training all new team members, during the site-specific training, on the site safety and health polices and procedures, which will include this HASP;
- Training all new team members on the hazards associated with the job site;
- Conducting daily tailgate safety meeting for all team members;
- Conducting weekly supervisor safety meeting;
- Conducting quarterly refresher type training;

- Posting and, if applicable, distributing safety information; and
- Encouraging open communications;

2.0 STAFF ORGANIZATION

2.1 Vice President/UXO Program Manager is responsible for enforcement of the Corporate Safety and Health Program at all worksites within his area of responsibility. He must assure that personnel receive the required training, medical surveillance, and personal protective equipment necessary in order to perform their jobs in a safe and effective manner. The enforcement of the Corporate Safety and Health Program on the worksites will be a critical rating element for site personnel.

2.2 Corporate Health and Safety Manager is responsible for creating, updating, and managing the Corporate Safety and Health Program, as well as Site Specific Health and Safety Plans for individual worksites. She reports directly to the Vice President/UXO Program Manager of EOTI on all safety and health issues. She coordinates directly with the Project Manager, the Senior UXO Supervisor, and the UXO Safety Officer routinely to answer technical questions and to provide assistance to the worksites. She also provides safety training, as needed, and performs safety and health program inspections to assure compliance with EOTI safety and health policy.

2.3 Project Manager (PM) is responsible for all day-to-day operations on the project site. He plans operating crews and schedules, and must assure all personnel are properly trained to perform their assigned tasks. The PM directly impacts the safety of the site by setting the tone for the job and encouraging safe performance among all team members. Any areas of concern or questions regarding safety and health issues are coordinated with the UXOSO. In instances of noncompliance with safety requirements, the PM issues warnings and/or provides disciplinary action up to and including removal of the employee from site operations, should this action be warranted. The PM assures that every accident on the work site is investigated in order to determine the root cause(s), the accident report is filled out, and takes steps necessary to prevent recurrences.

2.4 Team Leader/UXO Safety Officer (UXOSO) is responsible for the successful accomplishment of the work on the project site. He directly supervises all site work and personnel and assures they are operating in a safe manner. He is granted the authority to administer the safety and health program on the worksite. He must assure that all personnel, to include visitors, are properly trained, qualified, equipped, and protected from the hazards associated with the worksite and site operations. The Team Leader/UXOSO reports directly to the Project Manager on all project safety and health issues. He coordinates with the Corporate Health and Safety Manager for technical assistance on safety and health issues at the worksite, for assistance in ordering safety equipment, medical surveillance program issues, etc. The Team Leader/UXOSO has stop work authority whenever an imminent danger situation is observed. The Team Leader/UXOSO has numerous onsite responsibilities including, but not limited to:

- Coordinating with all applicable emergency response agencies to assure appropriate response should an emergency develop on site;

- Establish medical evacuation routes and emergency telephone number listing;
- Inventory first aid equipment, PPE, fire extinguishers and purchase replacements, as required, with concurrence from the PM;
- Survey the site for hazards;
- Provide daily safety briefings;
- Provide required safety training;
- Designate site control zones;
- Provide visitor briefing and training;
- Perform onsite monitoring, if required;
- Perform daily safety inspections of site activities to verify compliance with all safety and health requirements in this project HASP as well as the Corporate Safety and Health Program and recording any deficiencies in the Safety Log; and
- Coordination of corrective actions for any deficiencies noted during safety inspections.

2.5 Team Members are responsible for performing their assigned tasks in a safe and effective manner. Questions must be immediately brought to the attention of their supervisor. Team members must not attempt to perform an assigned task for which they have not been properly trained. All personnel must attend required safety training and be aware of the operations going on around them at the work site. Any situations or conditions, which may affect the safety and health of any team member, must be immediately reported to their supervisor. Before, during, and after use, personnel must inspect each piece of personal protective equipment, as well as other tools and equipment, to assure it is in a safe operating condition. Any equipment that is deemed unsafe for use, must be immediately turned in for repair or replacement. Personnel must know how to properly use all equipment assigned to them and must use required personal protective equipment at all times.

3.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

The project objective is to provide MEC support for the environmental investigation activities at site 19 of St. Juliens Creek Annex Chesapeake (SJCA), VA. Site 19 is the site of Building 190 located the confluence of Blows Creek and the Southern Branch of the Elizabeth River. The building historically handled loose ordnance materials and was used for loading explosives into munitions. From the 1940s to the 1970s, Explosive D and Composition A-3 were used at Building 190. In mid-1977, all ordnance-handling buildings were decontaminated by flushing with chemical solutions and water. Prior to decontamination, Naval Ammunition Production Engineering Center (NAPEC) visually inspected the facilities and collected samples for chemical analysis to develop appropriate decontamination procedures for each building. At the conclusion of the decontamination process, NAPEC visually re-inspected each building, collected samples for chemical analysis, and certified that the facilities were decontaminated. However, the level of decontamination was not specified and residue of ordnance remains. Building 190 was demolished sometime after 2000. Since that time, the rail spur that was associated with the building, located on the northern side, has also been decommissioned and removed from the Site.

EOTI UXO technicians will provide avoidance during sampling and soil removal activities required to remediate the site. An instrument assisted surface clearance will be conducted with a Schoenstadt or White Metal detector, in areas where sampling and/or soil removal activities are planned. The objective of the surface clearance to identify any Material Potentially Presenting an Explosive Hazard (MPPEH) on the surface of the project site that would potentially present a hazard to the project team as they access the site and complete sampling and removal activities.

In areas requiring soil removal, lifts will be limited to 6-12 inches depending on the type of MPPEH encountered and the ability to detect anomalies caused by the material. UXO technicians will be present during all excavation and will visually check excavated soil for MPPEH. Technicians will conduct magnetometer-assisted surveys of each lift prior to excavation activities. Qualified UXO technicians using hand tools to excavate and expose the source will investigate all anomalies. If expected MPPEH is identified on site, the UXO technician will immediately notify the project manager who will arrange for the local Navy EOD Unit to respond.

4.0 HAZARD ANALYSIS AND RISK ASSESSMENT

4.1 Activity Hazard Analysis (AHA)

An AHA has been conducted and documented as outlined below for each activity warranted by the hazards associated with the activity. For the Juliens Creek Annex site, the following activity hazard analyses (AHA) have been prepared for all anticipated field operations:

- MEC Identification and Recovery
- Vehicle and Equipment Fueling Operations

Should conditions, equipment, or types of operations change during the course of the project work, the Corporate Health and Safety Manager will update an existing AHA for continuing work, or prepare a new one for new types of operations. Should a hazardous item be encountered, fragmentation zones would be extended per the requirements of DoD 6055.9 STD.

4.2 Principles

Risk management is and will continue to be integrated into the planning, preparation, and execution of work at the Juliens Creek Annex site. Risk management is a dynamic process, and is continuously improved upon, as personnel become more familiar with the site operations, equipment, environment, etc. Personnel are urged to continuously identify hazards and assess accident risks. Once identified, these hazards will be brought to the attention of the Team Leader/UXOSO. Control measures will be developed and coordinated. All personnel are responsible to continuously assess variable hazards and implement risk controls.

ACTIVITY HAZARD ANALYSIS		
ACTIVITY: MEC Identification and Recovery	**ANALYZED BY/DATE: J. Daffron 02/01/06**	
PRINCIPLE STEPS	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
• Locate anomalies using magnetometers. • Mark anomaly locations with pin flags • Carefully dig around the item, so that it can be identified and examined for condition. • Examine item and plan for appropriate disposal by Navy EOD unit. • For heavy equipment excavations, a magnetometer survey will be done on every lift. • Anomalies will be carefully excavated using hands and hand tools, so that MEC identification can be made. • MEC recovered will be turned over to Navy EOD unit for disposal.	• MEC hazards • EMR for Electric Fuzes • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain carrying instruments • Heat Stress • Biological hazards - poisonous plants, bees, wasps, ticks, mosquitoes, rodents, and snakes. • Unauthorized personnel entering site during operations • Heavy equipment operations (noise, exhaust, crushing hazards).	• Training on MEC on site. • Controlled use of radios and cell phones. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures. (CSHP Chp21) • Heat stress monitoring, drinking water, work-rest schedule, and acclimatization. • Training in biological hazards avoidance; PPE. (CSHP Chp 21) • Site control measures will be implemented (fencing, barricades, signage). • Training in heavy equipment operations and excavation procedures, PPE.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
Appropriate geophysical equipment. • Footwear with ankle support and non-slip soles. • Back braces (optional) • Communications to determine WBGT Index, drinking water • Appropriate clothing and PPE to include hard hats and hearing protection (around heavy equipment operations), leather gloves and leg chaps (as required). • Barricades and signage.	**Team Leader/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use	• UXO personnel will be EODS graduates. • Site specific MEC training will be presented to all site personnel. • All UXO personnel will receive refresher training in excavating of anomalies. • Site specific training on slip, trip and fall hazards. • Site specific training/lifting techniques. • Heat/Cold Stress symptoms. • Site specific flora/fauna to include first aid. • All site personnel will have current HAZWOPER training. • Heavy equipment training.

ACTIVITY HAZARD ANALYSIS		
ACTIVITY: Vehicle and Equipment Fueling Operations	**ANALYZED BY/DATE: J. Daffron 02/01/06**	
PRINCIPLE STEPS	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
• Assure equipment/vehicle is in "off" position. • Assure there is no MEC in vehicle while fueling. • Assure vehicle/equipment is away from ignition sources. • Assure correct fuel is used. • Bond container to vehicle. • Fuel vehicle/equipment.	• Ignition of fuel vapors. • Spill of hazardous material. • Inhalation of vapors. • Splash of material on skin or eyes.	• Assure potential ignition sources are greater than 50 feet away. • Store in approved containers. • Education in static electricity. • NEVER fuel equipment in bed of a pick-up truck with a bed liner. • Assure fuels are properly handled/stored. • Education in spill containment/ clean-up procedure. • Perform fueling in open, well-ventilated area. • Wear eye protection and gloves • Train employees in first aid procedures.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
• Authorized vehicle, which meets DOT requirements. • Fire extinguishers (BC or ABC rated) in vicinity. • Flammable liquid storage containers. • Bonding wires • Chemical resistant gloves and eye protection.	**Team Leader/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use.	• HAZCOM Training. • Site Specific Training per SSHP on procedures. • Fire prevention/protection training. • Emergency procedures training.

5.0 TRAINING

Prior to commencement of site activities, the Corporate Health and Safety Manager and the Team Leader/UXOSO will ensure that all EOTI employees engaged in hazardous waste operations are informed of the nature and degree of exposure to chemical and physical hazards that are likely to result from participation in site operations. EOTI will accomplish this by ensuring that all personnel entering the site have received the appropriate OSHA and site-specific training, prior to participation in site activities. The other employees working on the site in other capacities not involving MEC operations will receive training on the hazards of the MEC operations on site and on MEC recognition and avoidance procedures, as well as emergency procedures. This training will be held at the time of site mobilization and will be reinforced during the daily safety briefings.

5.1 OSHA Training for General Site Workers

All EOTI employees who are involved in hazardous waste site activities receive 40 hours of OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) training. If it has been more than a year since any worker has received the 40 Hour OSHA HAZWOPER training, he or she must also have a current HAZWOPER 8-Hour Refresher Training prior to working on the site. All workers will also receive site-specific on-the-job training (OJT) under the direct supervision of a trained/experienced supervisor when they mobilize at the site. Any visitor entering the Exclusion Zone during hazardous waste operations will also be required to have current HAZWOPER training. The Exclusion Zone, during hazardous waste activities would include the project footprint and an area around the footprint equivalent to the fragmentation range of the largest MEC item expected to be encountered on the site.

The Team Leader/UXOSO will conduct the OJT. This training will include instruction covering the topics specified for site specific training, and on site participation in the following:

- Details of the Site Specific Health and Safety Plan;
- Employee rights and responsibilities;
- Safe work practices;
- Nature and extent of anticipated chemical and physical hazards;
- Measures and procedures for controlling site hazards;
- Emergency Response and Contingency Plan;
- Rules and regulations for vehicle use;
- Safe use of field equipment;
- Handling, storage, and transportation of hazardous materials;
- Use, care, and limitations of PPE;
- Hazard communication per OSHA 29 CFR 1910.1200.

5.2 OSHA HAZWOPER Manager and Supervisor Training

On-site managers and supervisors, who are responsible for directing others, will receive the same training as the general site workers for whom they are responsible. They will also receive an additional 8 hours of OSHA required supervisory training to enhance their ability to provide guidance and make informed decisions. This additional training includes the following:

- Review of the EOTI Corporate Safety and Health Program;
- Regulatory requirements;
- Management of hazardous waste site cleanup operations;
- Management of site work zones;
- How to communicate with the media and the public;
- PPE selection and limitations;
- Spill containment; and
- Monitoring site hazards.

The Team Leader/UXOSO, with specific responsibilities for safety and health guidance on site, will receive the training provided to general site workers and their supervisors. He also will receive advanced training in safety and health issues, policies and techniques.

5.3 MEC Training

All EOTI employees performing work involving the handling and destruction of MEC must be graduates of the Naval Explosive Ordnance Disposal School (at a minimum Phase I, chemical; and Phase II, surface) or equivalent recognized training. A copy of their certificate of graduation will be kept on file at corporate headquarters. UXO qualified personnel shall have knowledge and experience in military ordnance, ordnance components, and explosives location, identification, render safe, recovery/removal, transportation, and disposal safety precautions. UXO personnel shall have the knowledge and experience to effect safe handling and transportation of found ordnance items.

5.4 Hazard Communication

All EOTI employees who will be performing work involving the handling of hazardous materials will receive Hazard Communication training detailing the hazards of the product, appropriate protective measures to prevent exposure to the product, as well as safe procedures for storage and handling of the product, and response to emergencies. Personnel may request an MSDS for any hazardous material on the site at any time. The location of the MSDSs for this site will be in an MSDS binder in the Team Leader/UXOSO site vehicle, and all EOTI personnel will be made aware of that fact. This training will occur as part of the initial mobilization training at the site.

5.5 Tailgate Safety Briefing

Tailgate Safety Briefings consist of providing short training sessions in various subjects that give the site worker knowledge and confidence in performing duties in a potentially hazardous environment. The EOTI Documentation of Training Form doubles as the Tailgate Safety Brief Log/Form. The Tailgate Safety Briefing will be given prior to commencing work each day and will include such items as:

- Expected weather conditions;
- General site hazards;
- Biological hazards on site;
- MEC hazards;
- PPE required at each site;
- Emergency evacuation procedures;
- Cold/heat stress precautions;
- Buddy system procedures;
- A review of any safety violations from the previous day; and
- Any other significant events involving safety.

Additional briefings will be provided as needed concerning the use of safety equipment, emergency medical procedures, emergency assistance notification procedures, accident prevention, the work plan, and site orientation to ensure that accomplishment of the project can be carried out in a safe and effective manner. The construction workers, and others working in the vicinity will be invited to attend the daily tailgate safety briefings each morning.

5.6 Daily Debriefing

At the conclusion of each workday, a debrief for all employees will be held if appropriate, and the day's work will be discussed to determine if changes are warranted before commencing the next day's activities.

5.7 Periodic Site Training

On the first workday of each work week/period, or more frequently if needed, a pertinent topic will be selected and elaborated upon by the Team Leader/UXOSO during the Tailgate Safety Briefing. These safety meetings will help ensure the safety and health of site personnel in the performance of regular work activities and in emergency situations. Safety meetings will be documented in the appropriate log and the EOTI Documentation of Training Form will be completed.

5.8 Visitors

All visitors to the site, even if escorted, must receive as a minimum, a briefing on site conditions, hazards and emergency response procedures. The Team Leader/UXOSO will generally be the one providing the visitor briefing. All visitors to the exclusion zone will be escorted at all times. When visitors who are not UXO qualified enter the exclusion zone, all MEC operations will cease, and will resume again after the visitor has left the area. Visitors will not be permitted in the restricted work areas unless they have the appropriate level of OSHA training and are medically approved. Visitors not complying with the above requirements will not enter the restricted work areas; however, they may observe site conditions from a safe distance. All visitors will make appropriate entries in the Visitor's Log.

5.9 Training Documentation

A training record will be kept in each employee's individual file to confirm that adequate training for assigned tasks is provided and that training is current. In addition Documentation of Training Forms will be completed and kept on file at the work site for the duration of site activities.

5.10 First Responders

In accordance with 29 CFR 1910.120, there will be at least two personnel trained in First Aid and CPR on site if there is no medical facility within five minutes of the site. Personnel assigned as EMS first responders have current training in First Aid and CPR. First Responders also receive Bloodborne Pathogen Program training.

6.0 PERSONAL PROTECTIVE EQUIPMENT

Whenever feasible, engineering controls and work practices, or a combination thereof, shall be utilized to protect site workers from safety and health hazards and to maintain personal exposures to hazardous substances below established exposure limits. The exposure limits used by EOTI will be the lower of the OSHA Permissible Exposure Limits (PEL) found in 29 CFR 1910 Subpart G and 29 CFR 1910.1000, or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV). Other recognized published exposure levels, such as those found on MSDSs, will be used if the substance is not listed by OSHA or the ACGIH. EOTI will not utilize a system of employee rotation as a means of complying with the PPE, PEL, TLV or other published limits.

6.1. General Requirements

All personal protective equipment shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary. PPE is required due to hazards of processes or environment, chemical hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact. All PPE will be used in the manner for which it was designed. The assignment of PPE will be based upon hazard analysis, and the equipment will be selected based on its protection factor against site hazards. The level of PPE required at this site is expected to be Level D, as there are not expected to be many chemical hazards encountered. This PPE level may be raised by the Corporate Safety and Health Manager, in the event that additional hazards are encountered at the site.

6.2 Inspection

Each piece of PPE will be inspected daily prior to use. Defective or damaged personal protective equipment shall not be used. It shall be removed from service and turned in for repair, or removed from the site for disposal and replaced with new PPE.

6.3 Training

EOTI shall provide training to each employee who is required by this section to use PPE. Each affected employee shall demonstrate an understanding of the training, and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE. Each such employee shall be trained to know at least the following:

- When PPE is necessary;
- What PPE is necessary;

- How to properly don, doff, adjust, and wear PPE;
- The limitations of the PPE; and,
- The proper care, maintenance, useful life and disposal of the PPE.

When the Team Leader/UXOSO has reason to believe that any affected employee who has already been trained does not have the understanding and skill required he should retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete; or
- Changes in the types of PPE to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

6.4 Level D PPE

Due to the expected hazards at this site during most operations, level D PPE will be the requirement. Level D PPE is a work uniform affording minimal protection, used for nuisance contamination only. The following Level D equipment will be required on this site:

- Leather gloves.
- Face shields – during use of chain saws, weed-wackers and vegetation removal equipment.
- Safety glasses with side shields.
- Hearing protection, where required by high noise levels, in the vicinity of heavy equipment operations and vegetation clearance operations.
- Leather, work boots with ankle support and non-slip soles.
- Cotton work clothes.
- Back supports (optional).
- Leg chaps – required during use of chain saws, weed-wackers and vegetation removal equipment, optional during other operations unless snakes are encountered or suspected.
- Hard Hat – when working around heavy equipment, and during use of chain saws, weed-wackers and vegetation removal equipment.

6.5 Eye and Face Protection

All personnel shall use appropriate eye or face protection when exposed to eye or face hazards from flying particles, liquid chemicals, or other eye hazards.

- All personnel shall use eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g. clip-on or slide-on side shields) meeting the pertinent requirements of this section are acceptable. Due to the location and likelihood for glare, tinted safety glasses are recommended.
- All personnel who wear prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

- Eye and face PPE shall be distinctly marked to facilitate identification of the manufacturer.
- Protective eye and face devices purchased after July 5, 1994 shall comply with ANSI Z87.1-1989, "American National Standard Practice for Occupational and Educational Eye and Face Protection," which is incorporated by reference as specified in Sec. 1910.6.

6.6 Head Protection

When working in the vicinity of heavy equipment, as well as vegetation clearance equipment, hard hats will be worn. While there is not expected to be a danger of impact to the head due to falling or flying objects during other operations, it is recommended that personnel wear caps or some type of head covering for protection from the sun.

6.7 Foot Protection

Due to the uneven working surfaces and potential for tripping hazards common to a construction site, all EOTI personnel shall wear sturdy leather, work boots with ankle support and non-slip soles. Personnel using magnetometers for the detection of buried MEC will not wear steel-toe safety shoes, as they will affect the readings of the equipment. Personnel using power equipment that poses a potential foot hazard such as chain saws, weed-wackers, etc. will be required to wear steel toe or composite toe work boots.

6.8 Hand Protection

EOTI selects and requires employees to use appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; thermal burns; and harmful temperature extremes. For most operations on this site, leather gloves will provide adequate protection against minor cuts, which are a hazard in most site operations.

6.9 Noise Exposure

Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown below when measured on the A scale of a standard sound level meter at slow response. When employees are subjected to sound exceeding those listed in the following table, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels to within these levels, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table. If the variations in noise level involve maximal intervals of 1 second or less, it is to be considered continuous.

PERMISSIBLE NOISE EXPOSURES (1)	
Duration per Day, (Hours)	**Sound level dBA (Slow Response)**
8.00	90
6.00	92
4.00	95
3.00	97
2.00	100
1.50	102
1.00	105
0.50	110
0.25	115
Footnote (1). When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: C1./T1. + C2./T2. C(n)/T(n) exceeds unity, then, the mixed exposure should be considered to exceed the limit value. C(n) indicates the total time of exposure at a specified noise level, and T(n) indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level	

EOTI shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary. Hearing protection with a NRR of 29 dB will be required for all personnel in the vicinity of demolition operations. Hearing protection will also be required for all personnel working in and around any other operations likely to produce high noise levels, such as during the use of chain saws and weed-wackers during thinning and pruning operations and when working in the vicinity of heavy equipment.

6.10 Emergency Equipment

Emergency equipment will be maintained on site for the duration of site operations. An approved emergency first aid kit, bloodborne pathogen kit, and spill control kit will be kept in each site vehicle. Portable eyewashes will be located in the work area and in the site vehicles. A 5-lb. ABC fire extinguisher will be kept in each site vehicle for emergency use on site.

7.0 MEDICAL SURVEILLANCE

Medical surveillance of EOTI employees will be conducted IAW the requirements of OSHA 29 CFR 1910.120(f), 29 CFR 1910.134(b)(10) and other established guidelines. Personnel to be included in the Medical Surveillance Program will be those who perform hazardous waste operations that may potentially expose the worker to hazardous substances or other significant safety and health threats. All EOTI personnel on the St. Juliens Creek Annex project site will be part of the EOTI Medical Surveillance Program. Visitors desiring entry into the exclusion zone

must be on their employer's Medical Surveillance Program and must have a current physician's statement prior to entry.

A baseline health assessment physical or annual physical will be conducted prior to participating in site operations, to determine the worker's ability to perform hazardous waste operations in a safe and healthful manner. The Project Manager, in conjunction with the Team Leader/UXOSO, will ensure that all health assessments address the site specific health hazards to which workers may be exposed.

Physicals will be scheduled through the Corporate Health and Safety Manager, who will contract the services of a board certified occupational medicine physician in the vicinity of the employee's home or job site. The designated physician will perform the medical assessments and review medical examination results to determine each worker's ability to perform his assigned hazardous waste duties. The physician will also be responsible for determining if supplemental or follow-up examinations are required and for maintaining medical and exposure records IAW OSHA 29 CFR 1910.120(d).

The purposes of the Medical Surveillance Program are to:

- Assess the individual's health status prior to participation in hazardous waste operations; determine the individual's ability to perform work assignments requiring the use of personal protective equipment (PPE) and clothing;
- Establish baseline data for comparison to future medical data in order to provide a means of monitoring a worker's health status;
- Establish facilities and procedures for emergency and non-emergency medical treatment;
- Establish procedures for maintenance and storage of medical and exposure records.

7.1 Physician's Statement

The results of this examination will be made available to the employee and a written physician's statement will be sent to EOTI. A copy of the physician's statement will be kept in each employee's file at the project site for the duration of site operations. The physician's statement will include the following:

- The physician's opinion regarding any conditions which would place the employee at an increased risk from working in hazardous waste operations;
- The physician's recommended limitations upon the employee's assigned work, if any; and
- A statement that the employee has been informed by the physician of the results of the examination, and any conditions which may require further examination or treatment.

7.2 Supplemental Examination

Any site worker who has: been injured; received health impairment; developed signs or symptoms from possible over-exposure; or received a documented over-exposure without the use of respiratory protection, will undergo a supplemental examination. The contents of this examination will be based upon the type of injury, illness, signs or symptoms of exposure involved and will be determined by the physician. Prior to reassignment to site activities, the

physician will certify that the employee is fit to return to work. If necessary, the physician will specify in writing any activity restrictions or additional tests, which may be required.

7.3 Follow-up Health Assessments

If, during any pre-assignment, annual or supplemental examination, a condition is detected which requires follow-up tests, the physician will notify EOTI and the employee as to the nature of the follow-up health assessment. The physician will determine the schedule and content of the follow-up health assessment. A statement outlining the employee's fitness for work will be provided to EOTI and the employee upon conclusion of the follow-up health assessment.

7.4 Emergency and Non-emergency Medical Treatment

The medical treatment facility for use at this project site will be: Portsmouth General Hospital

Map and directions to the hospital can be found at paragraph 11.14.

7.5 Record Keeping

EOTI will retain and maintain copies of all physician statements, exposure records, and associated information for EOTI employees involved in hazardous waste operations. These records will be kept at the project site for the duration of site operations. When the site work is complete, the records will be retained by EOTI at the Oak Ridge, TN office. Examining physicians will be responsible for maintaining records related to laboratory and other tests for each EOTI employee examined. All records, whether maintained by EOTI or by the examining physician, will be kept on file for a period of thirty (30) years beyond an employee's termination IAW OSHA 29 CFR 1910.20(d).

8.0 ENVIRONMENTAL AND PERSONAL MONITORING

Due to the fact that there is not expected to be any significant exposure to hazardous chemicals at this site, chemical monitoring will not be required. As a result of the time of year this job is taking place, there may at times be a need for heat monitoring to prevent heat stress injuries from occurring. As the workers on this site will normally be in Level D PPE, heat stress monitoring will be required if the temperature goes above 75°F. Should it be required, site monitoring data will be recorded using the Site Monitoring Log and will be maintained as part of the project record.

8.1 Heat Stress Monitoring – Heat stress monitoring will be conducted using WBGT readings, in order to assure adequate work/rest cycles are implemented at the site. WBGT readings will be obtained from the construction contractor. Pulse monitoring may also be used in addition to the WBGT readings, particularly during acclimatization, to assure workers are

adapting to the conditions safely. Monitoring will be performed by the Team Leader/UXOSO and results will be documented. Heat stress monitoring will be used to determine work-rest cycles to be implemented on site.

8.2 Meteorological Monitoring – Rain can constitute a safety hazard to field operations at this site. The Team Leader/UXOSO will monitor the weather closely. If the area becomes so wet, muddy, or slippery that an unacceptable level of risk exists for personnel who are working in proximity to MEC items, then MEC operations will cease until the Team Leader/UXOSO determines it to be safe to continue.

No MEC operations will take place if an electrical storm is within ten miles of the site. An electrical storm monitor will be used to determine if an electrical storm is approaching. MEC operations will cease when an electrical storm is within ten miles of the site, and will not resume again until the Team Leader/UXOSO determines that the electrical storm is at least ten miles past the site.

9.0 SITE CONTROL

9.1 Site Map

A site map will be utilized by the Team Leader/UXOSO during the Tailgate safety briefing to inform the workers of the location of hazardous areas on the site, the assembly areas to be used in the event of site evacuation, and any other information relevant to the day's activities. The site map will include:

- Site topography
- Site work zones
- Location of unusual/hazardous areas
- Prevailing winds
- Ingress and egress corridors
- Evacuation routes and assembly points
- Location of emergency supplies

9.2 Work Zone Delineation and Access Points

Site work zones will be established by the Team Leader/UXOSO prior to initiating operations to control site access. Establishment of site work zones is based upon site conditions, activities and exposure potentials. A site Exclusion Zone will be set up, which includes the footprint of the area where work will take place and a 200 foot distance around that to protect areas outside the site from potential fragmentation. Site work zones will be marked using barricades and signage closing roads into the area to unauthorized vehicular traffic. Barricades and signs will remain in place for the duration of site work.

The Team Leader/UXOSO will control access to each work zone and will ensure that all site workers and visitors have received the proper training and medical surveillance required to enter

a specific zone. Access will be denied to any potential entrant not meeting these requirements. The following work zones will be established at this site:

- *Exclusion Zone (EZ)* – Area where significant hazard does or could occur and includes all areas where PPE is required to control worker exposure to chemical or physical hazards. All personnel entering the EZ will be logged in/out by the Team Leader/UXOSO. All visitors to the EZ must be escorted by a UXO-qualified EOTI employee (normally this would be the Team Leader/UXOSO). The EZ of this site will be designated as the footprint area of actual project operations and 200 feet surrounding the area. Entry into the project area will be under the control of the general contractor in conjunction with EOTI. The Navy Military Police will control use of the roads on the installation, including the access road to the construction site. The Military Police will be made aware of the boundaries of the exclusion zone, and close coordination will be made between EOTI and the Military Police regarding site hazards and road closures required for site operations. When personnel are required to enter within the exclusion zone in order to access other areas of the installation, all MEC operations will cease until all unrelated personnel are beyond the fragmentation area of the exclusion zone.
- *Support Zone (SZ)* – Area outside the EZ where site support activities are conducted. This zone includes break areas and sanitation facilities. Visitors desiring entry into the EZ must first meet with the Team Leader/UXOSO and receive the appropriate safety and emergency procedures briefing in the SZ before gaining admittance to the EZ, and they will be escorted at all times by a UXO-qualified employee while in the EZ.

9.3 On and Off-Site Communication System

If on or off site telephone communication is required, it will be established through the use of cellular telephones, and all personnel will have emergency phone numbers and understand how and under what conditions they are to be used. Cell phones will not be used around MEC where EMR may present a hazard, but will remain in the site vehicles with the emergency telephone number list for access during operating hours.

9.4 Site Access Controls

Site access control will be implemented by the construction contractor in coordination with the Team Leader/UXOSO and will be accomplished through a program that limits movement and activities of people and equipment at the project site. This control will be based on site-specific characteristics to include:

- Potential chemical, biological, physical or explosive hazards
- Terrain
- Expected weather conditions
- Planned site activities
- Site proximity to populated areas

The degree of site access control will include the following:

- Controlled site ingress/egress points – Work area will be clearly visible to anyone approaching the site and vice versa. The access road leading into the area will be closed and barricaded. Signs will be posted to warn unauthorized personnel against entry into the area. Anyone entering the work area must clear access through EOTI and/or the construction contractor. Only authorized personnel will be permitted within the EZ during MEC operations. All others will remain in the SZ.
- Worker/visitor registration – All personnel working on the site sign in daily at the time of their daily safety briefing in the morning. All visitors to the site must sign the visitor log when they report to the site for their visitor briefing.
- Escort of visitors – All visitors to the site will be escorted by a UXO-qualified EOTI employee. Visitors will be briefed on site hazards, PPE requirements, and emergency procedures. Visitors who are not UXO-qualified will not be permitted within the EZ during MEC operations. If visitors need to access the EZ, all MEC operations will cease while they are in the area, and the visitors will be escorted at all times.
- PPE requirements – PPE requirements have been established based on the site hazards. Personnel working in areas requiring PPE will wear required PPE for the duration of the operation. Visitors to the area will be required to have the required PPE for the area they will be visiting.

10.0 PERSONNEL AND EQUIPMENT DECONTAMINATION

Sanitation facilities will be provided in the support zone area so that employees can wash prior to eating, drinking, smoking, or engaging in any other hand-to-face activities. Plumbed toilets and washing facilities will be available in the support zone of the work area. As chemical contamination is not expected to be an issue at this site, basic washing of equipment and standard hygiene practices are all that will be required.

11.0 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES (ERCP)

The ERCP address the emergencies, which could occur during site operations, and outlines the appropriate response actions.

11.1 Pre-Emergency Planning and Incident Reporting

The Team Leader/UXOSO will perform the following pre-emergency tasks before starting field activities and during the mobilization and site specific training phase of the project, and will coordinate emergency response with EMT/police/fire personnel or other emergency response personnel when appropriate:

- Locate telephone stations;
- Post emergency telephone numbers at accessible telephone locations;
- Inspect all emergency equipment and supplies to ensure they are in proper working order;

- Provide a site map marked with planned evacuation routes, assembly points, and emergency equipment and supplies;
- Provide a map with the route to the hospital marked and highlighted, with copies of this map posted in the office/break trailer, in the emergency evacuation vehicle and all other site vehicles;
- Conduct an emergency response drill to test the effectiveness of the ERCP; and
- Review and revise the ERCP in the event of a failure of the plan in an actual or staged emergency, or when changes in site conditions or scope of work affect the ERCP.

11.2 Follow-Up and Documentation

Before normal activities are resumed, onsite personnel must be prepared and equipped to handle another emergency. These follow-up activities should be completed:

- The Health and Safety Manager will notify appropriate government agencies as required (Reminder: OSHA must be notified if there have been any fatalities or three or more hospitalizations).
- All equipment and supplies restocked, serviced and inspected; and
- Review and revise all aspects of the Health and Safety Plan as necessary to address and prevent future emergencies of this type.

Investigation and documentation of emergency responses shall be initiated by the Team Leader/UXOSO. This is important in all cases, but especially so when the incident has resulted in personal injury, property damage, or environmental impact. The documentation will be a written report and will be inclusive of the following:

- Accurate, concise and objectively recorded information;
- Authentic Information: Each person making an entry must sign and date that entry. Nothing is to be removed or erased. If details are changed or revised, the person making the change should strike out the old material with a single line and initial and date the change;
- Titles and names of personnel involved;
- Actions taken, decisions made, orders given, to whom, by whom, when, what, where, and how, as appropriate;
- Summary of data available;
- Possible exposure of personnel; and
- Copies of the Employer's Report of Occupational Injury or Illness (OSHA 300) or the EOTI Accident Report, as appropriate will be completed and forwarded to the Health and Safety Manager.

11.3 Accident Reporting

Reportable injury and occupational illnesses fall into one of the following categories:

- Fatality, including missing and presumed dead
- Permanent total disability

- Lost workday case involving days away from work
- Recordable case without lost workdays
- Recordable first-aid case
- Non-recordable injury/illness

The following unplanned events will also be investigated and reported:

- Damage to military property
- Damage to Department of Parks and Recreation Property
- Damage to contractor property
- Unplanned functioning of MEC.

[29 CFR 1904.8] Within 8 hours after the death of any employee from a work-related incident or the in-patient hospitalization of three or more employees as a result of work-related incident, the employer shall orally report the fatality/multiple hospitalization by telephone or in person to the nearest Area Office of OSHA. This will be accomplished by the Health and Safety Manager.

All recordable and reportable accidents will be recorded on the OSHA Form 300, Log of Federal Occupational Injuries and Illnesses, which will be maintained at the EOTI Safety Office. [29 CFR 1904.2]

All accidents will be investigated and immediate steps will be taken to prevent recurrence. The client will be notified of any accidents occurring on this project site.

11.4 Lines of Authority

In the event of an emergency, the Team Leader/UXOSO will be designated as the On-Scene Incident Commander and will have the overall responsibility for implementation of the ERCP and coordination with responding off site emergency services.

Once an emergency has occurred, the Team Leader/UXOSO will report the incident to the client representative, the Project Manager and the Health and Safety Manager as soon as the situation is under control.

If the emergency involves employee injury, the Team Leader/UXOSO will complete the EOTI Accident Report. The Health and Safety Manager will be responsible for notifying applicable Federal, state and local authorities/agencies. Once the emergency has been resolved, the Team Leader/UXOSO, Project Manager and Health and Safety Manager will conduct a follow-up investigation and critique. Actions will be taken to prevent recurrence.

11.5 Emergency Contacts

Emergency resources are as follows:

- Ambulance: 911
- Fire: 911
- Police: 911
- Hospital (757) 398-2200
- Poison Control Hotline: 1-800-222-1222
- EPA National Response Center: 1-800-424-8802
- CHEMTREC: 1-800-424-9300
- Federal OSHA Emergency Hotline: 1-800-321-OSHA (6742)
- Live Ordnance Emergency:

- TEU (duty hours) (410) 671-3601
- TEU (after duty hours) (410) 671-2773
- EOTI Program Manager, Wayne Lewallen (732) 345-8099
- EOTI Project Manager (865) 220-8668
- EOTI Health and Safety Manager (865) 220-8668

11.6 Standard Procedure for Reporting Emergencies

In the event of an emergency requiring off site assistance, the UXOSO or other designated site personnel will provide the following information:

- Name of person making call;
- Telephone number at location of person making call;
- Nature of emergency;
- Name of person(s) exposed or injured; and
- Actions already taken.

11.7 Emergency Prevention, Recognition and Notification

Prevention of emergencies will be aided by the effective implementation of this Site Specific Safety and Health Plan, personnel awareness, contingency planning, and onsite safety meetings. Anticipated emergencies may include physical injury, fire, explosion, chemical spill or release, inclement weather and natural disasters. The UXOSO will use the site-specific briefing and/or the Tailgate Safety Briefings to inform site workers of the recognition, prevention, and response procedures for each anticipated emergency.

In the event of an emergency, site personnel will be notified by either visual/verbal communication. Personnel will be notified to:

- Stop work activities;

- Evacuate to the designated assembly point;
- Begin emergency procedures; and
- Notify off site emergency response organizations.

11.8 Fires

The decision on whether or not to try to extinguish a fire using available site personnel and equipment will be made by the UXOSO and based on whether the fire is small, large or involves explosives.

11.8.1 Fire Protection

Portable fire extinguishers are rated and classified with NUMERAL and LETTER designations, based on fire tests conducted by the Underwriters Laboratories, Inc. (UL) or other nationally recognized testing laboratories. The numeral rating indicates the relative extinguishing effectiveness of extinguishers classified for Class A and B fires only. The Letter classified coincides with the Class of Fire. Extinguishers found to be effective on more than one Class of fire have multiple Letter classifications. Example: B:C

The rating of hand-portable fire extinguishers is based on the following:

- Class A fire extinguisher is used for ordinary combustible materials.
- Class B fire extinguisher is for flammable liquids.
- Class C fire extinguisher is for electrical fires.
- Class D fire extinguisher is for combustible metal fires.

Many fires are small at origin and may be extinguished by the use of proper hand-portable fire extinguishers. It is strongly recommended that the fire department be notified as soon as fire is discovered. This alarm should not be delayed awaiting result of application of portable fire extinguishers.

Fire extinguishers can represent an important segment of any overall fire protection program. However, their successful functioning depends upon the following conditions having been met:

- The extinguisher is properly located and in working order.
- The extinguisher is of proper type for a fire, which may occur.
- The fire is discovered while still small enough for the extinguisher to be effective.
- The fire is discovered by a person ready, willing, and able to use the extinguisher.
- Class A fires can be readily extinguished by quenching-cooling with water or a water-mixture agent. Class B fires are more effectively extinguished by an agent that blankets-smothers the fire through exclusion of oxygen surrounding the fire area. Those extinguishers containing bromochlorodifluoromethane, monobromotrifluoromethane, carbon dioxide, or dry chemical are generally best suited for extinguishing Class B fires. For Class C fires, the primary consideration in extinguishing this type of fire is the selection of nonconductive extinguishing agent to prevent dangerous electrical shock and possible death to user.

- Water or water-mixture type extinguishing agent must not be used under any circumstances on energized electrical equipment (Class C) fires. Whenever possible, electrical equipment and circuits should be de-energized before attacking a Class C fire.
- Due to its corrosive nature, dry chemical is not recommended for use on computerized, electronic or other equipment with extensive circuitry.

11.8.2 Small Fires

A small fire is defined as a fire that can most likely be extinguished by site personnel using portable extinguishers. A small fire must also be free and clear of explosive materials, especially MEC. If a small fire occurs, the UXOSO will direct site personnel to perform the following, if safe to do so:

- Evacuate unnecessary personnel to an upwind position;
- Attempt to extinguish the fire using portable fire extinguishers or by smothering;
- Remove any essential or flammable items from the path of the fire; and
- Notify emergency response services (fire, police, ambulance, hospital, etc.) as needed.

If a fire extinguisher is used, this must be immediately reported to the UXOSO. The fire extinguisher must be immediately removed from service until it can be recharged. Another fire extinguisher must be made available to the operating area. The area around where the fire occurred must be watched for a minimum of 30 minutes after the fire has been extinguished to assure re-ignition does not occur. If personnel are not working in the area, the UXOSO should check the area of the fire periodically to assure re-ignition does not occur.

11.8.3 Large Fires

A large fire is defined as a fire, which cannot be extinguished, or which, due to its size, cannot be extinguished using portable fire extinguishers. In the event that a large fire occurs and the fire does not involve explosive materials, the UXOSO will direct personnel to conduct the following, if safe to do so:

- Evacuate all non-essential personnel from the site to an upwind location;
- Notify the Fire Department and other emergency response services (police, ambulance, hospital, etc.) as needed;
- Order the appropriate level of protective equipment to be worn by personnel responding to the fire;
- Attempt to control the fire to the extent possible; and
- Remove any essential or flammable items from the path of the fire.

11.8.4 Fires Involving Explosive Materials

If a fire occurs which involves explosive materials such as chemicals, fuels or UXO, the UXOSO will order the immediate evacuation of all site personnel to an upwind assembly point at least fragmentation distance from the fire site. The UXOSO will then notify the Fire Department and any other emergency services (police, ambulance, hospital, etc.) as needed. At no time will EOTI personnel fight a fire involving explosive materials, nor will they allow outside emergency

personnel to do so. The Fire Department personnel may not enter any closer than fragmentation distance from the fire and they may spray water to surrounding buildings, structures, etc. in order to prevent the spread of fire.

After the fire has burned itself out, the site must be barricaded and entry prohibited until adequate cooling time has passed (at least 24 hours for a large fire). Explosive materials that may not have discharged during the fire may still be liable to function in the presence of extreme heat. After the site has cooled down, the Team Leader/UXOSO will inspect the site and condition of any MEC involved in the fire and make a determination as to whether or not the site is safe for others to enter.

If MEC is still intact, the Team Leader/UXOSO will determine whether or not it is safe to move to an approved disposal site. If it is considered unsafe to move, the Navy will be called and it will be destroyed in place. All MEC must be either removed or destroyed in place before non-UXO qualified personnel are permitted to enter the area.

If non-UXO qualified personnel must enter the site for purposes of fire investigation, etc. they must receive a briefing on the potential hazards of MEC on the site. They must be accompanied at all times by a UXO qualified employee of EOTI. NO OUTSIDE PERSONNEL WILL BE PERMITTED ONTO THE SITE WHILE THERE IS A KNOWN MEC HAZARD PRESENT. If during the course of the investigation MEC is observed, the site will be evacuated of all non-UXO qualified personnel until the site can be rendered safe for re-entry.

11.9 Explosions

In the event of an explosion, the Team Leader/UXOSO will order the evacuation of all site personnel to a safe, upwind assembly point at least fragmentation distance away. The Team Leader/UXOSO will then notify all necessary emergency response services. After an explosion has occurred the site will remain barricaded a minimum of 30 minutes before entry is permitted. The Team Leader/UXOSO will enter the site with another UXO-qualified EOTI employee and inspect for presence and condition of MEC. If MEC is safe to move to an approved disposal site, it will be removed. If not, the AGVIQ Supervisor will be notified and the MEC will be destroyed in place by Bomb Disposal personnel or Navy EOD personnel. Non-UXO qualified personnel may not enter the area until all known MEC has been removed or destroyed. If non-UXO qualified personnel need to enter the site, they must first be briefed on the potential hazards of the site. They must be accompanied at all times by an UXO-qualified employee. If MEC is discovered during the course of their visit, they must immediately leave the site until it can be rendered safe for re-entry.

11.10 Spill or Leak of Hazardous Materials

In the event of a spill or leak of any potentially harmful material (regardless of quantity) on site personnel will:

- Notify the Team Leader/UXOSO immediately;
- The Team Leader/UXOSO shall notify the Project Manager of the spill/leak with relative information (location, time, chemical identity, quantity, hazards listed on the MSDS), and any corrective actions/measures taken;

- Locate the source and stop the leak/spill if it can be done safely (as dictated by the Team Leader/UXOSO);
- Begin containment and recovery of spilled material (as directed by the Team Leader/UXOSO), using appropriate PPE and spill clean-up equipment and materials; and
- Once notified, the EOTI Project Manager will in turn notify the Client Project Manager and the Contracting Officer. The Client Project Manager will advise EOTI if any additional actions are necessary, or provide emergency response team notification, if required.

11.11 Site Topography, Layout, and Prevailing Weather Conditions

A site map will be prepared by the Team Leader/UXOSO prior to start of site operations, which shows topography, site layout, and prevailing weather conditions. The location of first aid supplies and equipment will also be noted on the map, as will the route to the nearest hospital. The site map will be used to provide training to site staff, and a copy of it will be kept in each site vehicle for emergency use.

11.11.1 Inclement Weather Plan

Per paragraph 6.8.2, rain, high winds, or other inclement weather can constitute a safety hazard to field operations at the site. The Team Leader/UXOSO will monitor the weather closely. If the area becomes so wet, muddy or slippery that an unacceptable level of risk exists for personnel who are working in proximity to MEC items, then MEC operations will cease until the Team Leader/UXOSO determines it to be safe to continue. The Team Leader/UXOSO has the authority to halt operations for any inclement weather conditions, which could negatively impact on the safety of field personnel.

No MEC operations will take place if an electrical storm is within ten miles of the site. An electrical storm monitor will be used to determine if an electrical storm in approaching. MEC operations will cease when an electrical storm is within ten miles of the site, and will not resume again until the Team Leader/UXOSO determines that the electrical storm is at least ten miles past the site.

11.12 Site Evacuation Procedures

In the event of an emergency that requires evacuation of the site, verbal instruction will be given by the Team Leader/UXOSO to evacuate the area. Personnel will exit the area to the pre-designated assembly point, which will be the office trailer.

After evacuation, the Team Leader/UXOSO will account for all personnel, ascertain information about the emergency and advise responding onsite personnel. The Team Leader/UXOSO will contact, advise and coordinate with responding off-site emergency personnel if deemed necessary by the situation.

In all situations that require evacuation, personnel shall not re-enter the work area until:

- The conditions causing the emergency have been corrected;
- The hazard has been reassessed;

- The Site Specific Safety and Health Plan has been revised and reviewed with onsite personnel, if needed; and
- Instructions have been given for authorized re-entry by the Team Leader/UXOSO.

11.13 Emergency Medical Treatment and First Aid

In the event of an emergency involving personal injury or illness, the construction contractor will have two site personnel qualified in CPR/First Aid who will be the first responders to a site emergency until professional medical assistance arrives on the scene. Emergency medical services will be summoned, if deemed necessary by the Team Leader/UXOSO. A first aid kit will be placed in the site vehicle and the office trailer. A bloodborne pathogen kit will also be kept with each first aid kit. The Team Leader/UXOSO will have final authority on the decision to require additional professional medical services (i.e., paramedics, hospital visit, etc.) for any illness or injury.

11.14 Route to Nearest Medical Facility

The nearest medical facility is: Portsmouth General Hospital

All Supervisory personnel shall maintain a phone listing of the nearest available medical assistance in the event of an accident. This telephone listing will be kept beside each telephone. The Team Leader/UXOSO will ensure that the Emergency Medical Assistance list is updated and provided to all supervisors. Directions to the nearest medical facility will be kept in each vehicle.

The hospital address is: Maryview Medical Center
3636 High St
Portsmouth, VA 23707

DISTANCE TO THE HOSPITAL: 6.6 miles

ROUTE TO THE HOSPITAL: From Chesapeake, start on 22ND ST go toward D ST - go < 0.1 mi Turn Left on RODGERS ST - go 0.1 mi Turn Right on POINDEXTER ST - go 0.3 mi, Take ramp onto I-464 NORTH toward I-264 - go 1.4 mi, Take exit #6A onto I-264 WEST - go 3.2 mi, Take exit #5/US-17 onto FREDERICK BLVD[US-17] - go 1.2 mi, Turn Left to follow US-17 NORTH - go 0.4 mi, Arrive at 3636 HIGH ST, PORTSMOUTH, on the Right.

11.15 Criteria for Initiating Community Alert Program

In the event an incident on the site has the potential to impact the general community or bring adverse attention or publicity to the AGVIQ, the Safety Representative for AGVIQ, will be notified and in turn notify the Public Affairs Office, who will in turn provide any statements to the public or the media at their discretion.

11.16 MSDS

As part of the EOTI Hazard Communication Program, an MSDS binder will be maintained onsite, which includes copies of MSDSs for all hazardous materials brought onto the site by EOTI. It will be kept in the Team Leader/UXOSO's site vehicle during operations. This MSDS binder will be available on request to all site personnel during all working hours of the site. If site workers have further questions about any of the hazardous materials they come into contact with, the EOTI Health and Safety Manager will locate the required information and pass it on to the employee.

12.0 CONFINED SPACE ENTRY

According to OSHA 29 CFR 1910.146, a confined space is defined as having all of the following criteria:

- It is large enough and so configured that an employee can bodily enter and perform assigned work.
- Is not designed for continuous human occupancy.
- Has limited or restricted means for entry or exit.

If an excavation meets all three of the criteria listed above, it must be defined as a confined space, and the provisions and safety precautions of the EOTI Confined Space Entry Program (Chapter 26) will apply.

To avoid classifying an excavation as a confined space, it is imperative that one of the requirements listed above be removed or avoided. The easiest requirement to remove is the one related to limited means of entry and exit. Entry/exit points must be designed and maintained which allow for easy entry and exit from the excavation. This can be accomplished through the construction of gently sloping entry and exit ramps, which are located, such that lateral travel to an exit is no greater than 25 feet from the work area in the excavation. If this cannot be accomplished, then the excavation must be classified as a confined space and the appropriate safety precautions implemented.

As work on this site involves MEC construction support, confined space entry work is not expected to apply. However, if it should become necessary, due to the configuration/depth of excavations, EOTI has a formal confined space program in place that would be applied.

13.0 SPILL CONTAINMENT

Major spills are not expected on this site. Hazardous materials, where necessary, are being brought to the site in small quantity containers. This will minimize the amount of material involved, should a spill occur, as well as reducing the amount of hazardous material on hand to the minimum amount consistent with efficient operations. If a small amount of liquid hazardous material is spilled, it will be cleaned up with absorbent material by site personnel wearing appropriate chemical resistant gloves. It will then be containerized, labeled, and sent for disposal at an approved facility.

14.0 TEMPERATURE EXTREMES

Heat stress is one of the most common (and potentially serious) illnesses that affect hazardous waste site workers. When site personnel are engaged in operations involving hot environments and/or the use of semi- or impermeable clothing, a number of physiological responses can occur which may seriously affect the health and safety of the workers. These affects can be eliminated or controlled through the use of a comprehensive heat stress prevention and monitoring program.

Level D PPE is being used at this site, so the heat stress program will be implemented if the ambient temperature exceeds 75°F.

14.1 Causes of Heat Stress

The most common cause of heat stress during site activities is the affect that PPE has on the body's natural cooling mechanism. Impermeable PPE interferes with the evaporation of perspiration and causes the body to retain metabolic and environmentally induced heat. Individuals will vary in their susceptibility and degree of response to the stress induced by increased body heat. Heat stress can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors including environmental condition, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at hazardous waste sites, regular monitoring and other preventive precautions are vital.

Factors, which may predispose a worker to heat stress, include:

- Lack of physical fitness.
- Lack of acclimatization to hot environments.
- Degree of hydration.
- Level of obesity.
- Current health status (i.e., having an infection, chronic disease, diarrhea, etc.).
- Alcohol or drug use.
- The worker's age and sex.
- Sunburn.

Prior to initiating site activities each day, and periodically throughout the day, the Team Leader/UXOSO will inspect the site personnel for evidence of the previously mentioned factors to determine those personnel who are at increased risk for heat stress related disorders. Evidence of extreme dehydration, illness or drug or alcohol use may require the Team Leader/UXOSO to restrict the worker's activities until such time as the worker is fit for duty. Personnel identified as being at high risk for heat stress, who are allowed to participate in site operations, will be monitored frequently by the Team Leader/UXOSO throughout the day.

14.2 Heat Stress Disorders

This Section outlines the major heat related illnesses that may result from exposure to high heat environments and/or the use of semi- or impermeable clothing. For the purpose of this Program,

reference to "liquids" will indicate the use of water or an electrolyte replacement solution, and not tea or coffee (unless it is decaffeinated) or carbonated soft drinks.

14.2.1 Heat Rash

Heat rash is caused by continuous exposure to heat and humid air and is aggravated by wet chafing clothes. This condition can decrease a worker's ability to tolerate hot environments.

Symptoms: Mild red rash, especially in areas of the body, which sweat heavily.

Treatment: Decrease the amount of time in protective gear and provide powder such as corn starch or baby powder to help absorb moisture and decrease chafing. Maintain good personal hygiene standards and change into dry clothes if needed.

14.2.2 Heat Cramps

Heat cramps are caused by a profuse rate of perspiration that is not balanced by adequate fluid and electrolyte intake. The occurrence of heat related cramps are often an indication that excessive water and electrolyte loss has occurred, which can further develop into heat exhaustion or heat stroke.

Symptoms: Acute, painful spasms of voluntary muscles such as the back, abdomen and extremities.

Treatment: Remove victim to a cool area and loosen restrictive clothing. Stretch and massage affected muscles to increase blood flow to the area. Have patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Consult with physician if condition does not improve. If available, an electrolyte replacement solution should be taken along with liquids. For maximum benefit, this should be taken in at least a 2:1 ratio with at least two glasses of water to one glass of electrolyte replacement liquid.

14.2.3 Heat Exhaustion

Heat exhaustion is a state of very definite weakness or exhaustion caused by increased stress on various organs to meet increased demands to cool the body due to excessive loss of fluids from the body. This condition leads to inadequate blood supply and cardiac insufficiency. Heat exhaustion is less dangerous than heat stroke, but nonetheless must be treated. If allowed to go untreated, heat exhaustion can quickly develop into heat stroke.

Symptoms: Pale or flushed, clammy, moist skin, profuse perspiration, and extreme weakness. Body temperature is basically normal or slightly elevated, the pulse is weak and rapid, and breathing is shallow. The individual may have a headache, be dizzy or nauseated.

Treatment: Remove the individual to a cool, air-conditioned place, loosen clothing, elevate feet and allow individual to rest. Consult physician, especially in severe cases. Have patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Total liquid

consumption should be about one to two gallons per day. If the signs and symptoms of heat exhaustion do not subside, or become more severe, immediate medical attention will be required.

14.2.4 Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the heat regulating mechanisms of the body. The failure of the individual's temperature control system causes the perspiration system to stop working correctly. When this occurs, the body core temperature rises very rapidly to a point (105+°F) where brain damage and death will result if the person is not cooled quickly.

Symptoms: The victim's skin is hot, and may or may not be red and dry, (due to the fact that the individual may still be wet from having sweat while wearing protective clothing earlier), nausea, dizziness, confusion, extremely high body temperatures, rapid respiratory and pulse rate, delirium, convulsions, unconsciousness or coma.

Treatment: Cool the victim immediately. If the body temperature is not brought down quickly, permanent brain damage or death may result. The victim should be moved to a shady area; lie down and keep the head elevated. Gradually cool the victim by either sponging or immersing the victim in cool water to reduce the core temperature to a safe level (<102°F). If conscious, give the victim cool liquids to drink. Observe the victim and obtain immediate medical help. Do not give the victim caffeinated or alcoholic beverages. Heat stroke is considered a medical emergency. Medical emergency assistance must be summoned.

14.3 Preventive Measures

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat exhaustion, that person may become predisposed to additional heat injuries. In order to avoid heat related illnesses, proper preventive measures will be implemented whenever environmental conditions dictate the need. These preventive measures represent the minimal steps to be taken and will include the following procedures:

- The Team Leader/UXOSO will examine each site worker prior to start of daily operations to determine the individuals susceptible to heat induced stress. Workers exhibiting factors, which make them susceptible to heat stress, will be closely monitored by the Team Leader/UXOSO.
- Site workers will be trained to recognize and treat heat-related illnesses. This training will include the signs, symptoms and treatment of heat stress disorders as outlined in this Program.
- In order to maintain workers' body fluids at normal levels, workers will be encouraged to drink, as a minimum, approximately sixteen ounces of liquids prior to start of work in the morning, after lunch and prior to leaving the site at the conclusion of the day's activities. Disposable four (4) to twelve (12) ounce cups and liquids will be provided on site. Acceptable liquids will include water and an electrolyte replacement solution, with the recommended intake being two cups of water to each cup of electrolyte replacement solution. Liquids containing caffeine are to be avoided.

- When ambient conditions and site workload requirements dictate, as determined by the Team Leader/UXOSO, workers will be required to drink a minimum of sixteen (16) to thirty-two (32) ounces of liquids during each rest cycle. The normal thirst mechanism is not sensitive enough to ensure that enough water will be taken to replace lost sweat. When heavy sweating occurs, workers should be encouraged to drink even though they may not be thirsty. The following strategies may useful in encouraging fluid intake:
    - Maintain water temperature at 50°F to 60°F (10°C to 15.6°C).
    - Provide small disposable cups that hold about 4 ounces (0.1 liter).
    - Have workers drink 16 ounces (0.5) liters) of fluids (preferably water or dilute drinks) before beginning work..
    - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- A shelter or shaded area will be provided where workers may be protected from direct sunlight during rest periods.
- Monitoring of ambient or physiological heat stress indices will be conducted to allow prevention and/or early detection of heat induced stress. Monitoring will be conducted in accordance with applicable paragraphs of this Program.
- Site workers will be given time to acclimatize to site work conditions, temperature, and workload. Acclimatization usually takes about a week of continued work in hot environments, and allows the worker's body to become adjusted to this level and type of work. This process involves a gradual increase in the workload over the required period, the length of which depends upon the nature of the work performed, the ambient temperatures and the individual's susceptibility to heat stress.
- Work schedules will be adjusted as follows:
    - Modify work/rest schedules according to monitoring requirements.
    - Mandate work slowdowns as needed.
    - Rotate personnel: alternate job functions to minimize overstress or overexertion at one task.
    - Add additional personnel to work teams.
    - Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

14.3.1 Supplemental Preventive Measures

Workers will be encouraged to achieve and maintain an optimum level of physical fitness. Increased physical fitness will allow workers to better tolerate and respond to hot environments and heavy workloads. In comparison to an unfit person, a fit person will have: less physiological strain; a lower heart rate and body temperature; and a more efficient sweating mechanism.

14.4 Administrative Controls and Work Practices

Training is the key to good work practices. Unless all employees understand the reasons for new or changing old, work practices, the chances of such a program succeeding are greatly reduced. The following will be discussed during the site-specific training and repeatedly, as determined by the Team Leader/UXOSO:

- Knowledge of the hazards of heat stress;
- Recognition of predisposing factors, danger signs, and symptoms;
- Awareness of first-aid procedures for, and the potential health effects of, heat stroke;
- Employee responsibilities in avoiding heat stress;
- Dangers of using drugs, including therapeutic ones, and alcohol in hot work environments;
- Use of protective clothing and equipment;
- Purpose and coverage of environmental and medical surveillance programs and the advantages of worker participation in such programs; and
- Dietary effects on heat stress.

14.5 Heat Stress Monitoring

Because the incidence of heat stress depends on a variety of factors, all workers, even those not wearing protective equipment, should be monitored. Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work (see Table 1). The length of the work cycle will be governed by the frequency of the required physiological monitoring.

For workers wearing permeable clothing (e.g., standard cotton or synthetic work clothes), follow recommendations for monitoring requirements and suggested work/rest schedules in the current American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for Heat Stress. If the actual clothing worn differs from the ACGIH standard ensemble in insulation value and/or wind and vapor permeability, change the monitoring requirements and work/rest schedules accordingly.

The goal of all heat stress monitoring is to ensure that the worker's body temperature does not exceed 100.4°F. The physiological monitoring methods listed below are to be implemented based upon the severity of the heat and workload. As a minimum, the Team Leader/UXOSO will perform WBGT monitoring. He will get WBGT readings from the construction contractor. He may also choose to monitor the worker's heart rate as an indication of potential heat stress. The frequency of physiological monitoring will be determined using the information presented in Table 1.

14.5.1 Heart Rate Monitoring

The worker's baseline heart rate should be recorded prior to initiation of site activities by measuring the radial pulse rate for thirty seconds. After each work cycle, the heart rate should be measured by taking the pulse rate (PR) for 30 seconds as early as possible into the resting period.

Taking the radial (wrist) pulse rate is the preferred method, however the carotid (neck) pulse rate may be taken if a worker has difficulty finding the radial pulse. The PR at the beginning of the rest period should not exceed one hundred and ten (110) beats per minute (bpm). If the PR is higher than 110 bpm, the next work period should be shortened by thirty-three percent, while the length of the rest period stays the same. If the PR exceeds 110 bpm at the beginning of the next rest period, the work cycle should be further shortened by thirty-three percent. This procedure will be continued until the worker's PR at the beginning of the rest cycle is maintained below 110 bpm.

14.5.2 Wet Bulb, Dry Globe Temperature (WBGT) Monitoring

For site conditions where personnel are working in Level D PPE, and the ambient temperature is greater than 75°F, the Team Leader/UXOSO will conduct WBGT monitoring to assist in controlling the potential for site workers experiencing heat related adverse health affects. The Team Leader/UXOSO will use WBGT monitor readings obtained from the construction contractor, and after estimating the workload, use the values expressed in Table 2, to determine the work/rest schedule to be implemented. The values outlined in this table are designed such that nearly all acclimatized, fully clothed workers with adequate salt and water intake will be able to function without the body temperature exceeding 100.4°F.

Acclimatization is the adaptive process that results in a decrease of the physiological response produced by the application of a constant environmental stress. On initial exposure to a hot environment, there is an impaired ability to work and evidence of physiological strain. If the exposure is repeated on several successive days, there is a gradual return of the ability to work and a decrease in physiological strain. Within 4 to 7 days following initiation of the acclimatization process, a dramatic improvement in the ability to perform work is noticed: subjective discomfort practically disappears; body temperature and heart rate are lower; there is a more stable blood pressure; and the sweat is more profuse and dilute.

Alcohol should not be consumed in a hot environment because the loss of body fluids increases the risk of heat stress.

14.6 Heat Stress Documentation

Should it be required due to site conditions, the Team Leader/UXOSO will be responsible for recording all heat stress related information. This will include training sessions and monitoring data. Training sessions will be documented using the Documentation of Training Form. Pulse rate monitoring data will be recorded on the Heat Stress Monitoring Log, with the WBGT being recorded in the Site Safety Log, and/or Site Monitoring Log.

TABLE 1
SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FOR FIT AND ACCLIMATIZED WORKERS[a]

ADJUSTED TEMPERATURE[b]	NORMAL WORK ENSEMBLE[c]	IMPERMEABLE ENSEMBLE
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-28.1°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

[a] For work levels of 250 kilocalories/hour.

[b] Calculate the adjusted air temperature (at adj) by using this equation: at adj °F = ta °F + (13 x % sunshine). Measure air temperature (at) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

[c] A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

TABLE 2
PERMISSIBLE WBGT HEAT EXPOSURE THRESHOLD LIMIT VALUES

Work - Rest Regimen	WORK LOAD Light*	Moderate	Heavy
Continuous work	86 (30.0)	80 (26.7)	77 (25.0)
75% Work - 25% Rest, each hour	87 (30.6)	82 (28.0)	78 (25.9)
50% Work - 50% Rest, each hour	89 (31.4)	85 (29.4)	82 (27.9)
25% Work - 75% Rest, each hour	90 (32.2)	88 (31.1)	86 (30.0)

Consult the ACGIH TLV booklet for definitions of Light, Moderate and Heavy workloads. Values are given in ^{0}F and (^{0}C) WBGT, and are intended for workers wearing single layer summer type clothing. Use of semi or totally impermeable clothing requires monitoring IAW the SCI Heat Stress Prevention Program. As workload increases, the heat stress impact on a nonacclimated worker is exacerbated. For unacclimatized workers performing a moderate level of work, the permissible heat exposure TLV should be reduced by approximately 2.5^{0}C.

14.7 COLD STRESS

The affects experienced by site personnel when working in cold environments depend upon many environmental and personal factors, such as ambient air temperature, wind speed, duration of exposure, type of protective clothing and equipment worn, type of work conducted, level of physical effort, and health status of the worker. In cold environments, overexposure can cause significant stress on the body, which can lead to very serious and permanent injury. Cold may affect just the exposed body surfaces and extremities, or may affect the deeper body tissues and the body core. Presented below is information about the most common cold stress disorders, and their signs, symptoms, effects, and control techniques.

Hypothermia, immersion, and frostbite result from extremes in cold exposure. Hypothermia conditions can affect judgment and reasoning ability. Protective clothing such as gloves and Saranex protective clothing should minimize cold conditions by reducing evaporation. Similarly, movement and activity will reduce cold stress by increasing metabolism.

Cold temperature extremes can be made more dangerous by water and wind speed. A wind chill chart is at Table 3. At temperatures below 32°F, the effects of wind speed become pronounced.

The use of a tarp or other barrier should be considered as a contingency to reduce the effects of wind speed.
In cold extremes, if feet become soaked they should be dried at the earliest possible time. Water conducts heat faster than air.

During decontamination procedures, the body cools suddenly when chemical protective equipment is removed if clothing underneath is soaked with perspiration. In cold extremes after decontamination procedures, site employees will proceed to a protected area.

14.8 DANGER FROM FREEZING OF EXPOSED FLESH

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is soaked with perspiration.

14.9 COLD STRESS DISORDERS

14.9.1 Immersion Foot or Trench Foot

These two cold injuries occur as a result of exposure to cool or cold weather and persistent dampness or immersion in water. Immersion foot usually results from prolonged exposure when air temperatures are above freezing, whereas trench foot normally occurs from shorter exposure at temperatures near freezing. The symptoms for each disorder are similar and include tingling, itching, swelling, pain in some cases or numbness in others, lack of sweating, and blisters.

14.9.2 Hypothermia

Hypothermia results when the body loses heat faster than it can produce it. When this occurs, the blood vessels in the skin and extremities constrict, reducing the flow of warm blood to those areas, thereby reducing the rate of heat loss. This reduction in blood flow usually affects the peripheral extremities first. Ears, fingers and toes begin to experience chilling, pain and then numbness due to loss of both blood flow and heat. Shivering begins as the body's core temperature begins to drop, and the body uses the shivering to compensate and create metabolic heat. Shivering is often the first sign of hypothermia. The pain and numbness in the extremities is an indication that the heat loss is increasing, and when shivering becomes uncontrollable, the heat loss in the body core has become extreme. Energy reserves are exhausted. Once the cold reaches the brain, the person will be deprived of judgment and reasoning power. They will not realize this is happening and will also lose control of their hands. The internal temperature will continue to drop downward, and without treatment, this will lead to stupor, collapse, and death. The victim should be brought to a warm location, and if conscious should be made to drink warm fluids.

14.9.3 Frostbite

Frostbite occurs when there is actual freezing of the water contained in the body tissues. This usually occurs when temperatures are below freezing, but excessive wind can result in frostbite even at ambient temperatures that are above freezing. Frostbite can occur from several types of cold exposure, such as: exposure of bare skin to cold and wind; exposure to extremely cold ambient temperatures; or from skin contact with objects whose temperatures are below freezing. The extremities are usually affected first since they experience reduced blood flow and heat loss. The tissue damage caused by frostbite can be superficial, near the surface of the skin, or extend to deeper body tissues, which can cause severe tissue damage. The skin may first have a prickly or tingling sensation and later become numb with cold, and the appearance may range from superficial redness of the skin to white, hard, frozen-looking tissues.

Frost nip or incipient frostbite is the condition characterized by sudden blanching or whitening of the skin. Superficial frostbite is when the skin has a waxy or white appearance and is firm to the touch, but the tissue beneath is resilient. Deep frostbite is when the tissues are cold, pale, and solid. Deep frostbite is an extremely serious injury. Where deep frostbite exists, it is essential to get the patient to the hospital as quickly as possible.

14.9.4 Treatment of Cold Stress Disorders

The intent of all cold stress treatment is to bring the deep body core temperature back to its normal temperature of about 98.6°F. Work performed in cold environments should be discontinued for any worker who exhibits the signs or symptoms associated with hypothermia or frostbite. Workers exhibiting those symptoms should be brought to a warm area and allowed to rest and warm-up. If a worker's clothing becomes wet, which reduces its insulation effect, it should be removed and replaced by dry clothing, or allowed to dry before resuming work. A warm, non-alcohol, de-caffeinated drink (not coffee) or soup may be given. Re-warming should be gradual.

For frostbite, the victim should be sheltered from the wind and cold and given warm drinks. If the frostbite is superficial, the frozen part should be covered with extra clothing or blankets or warmed against the body. **Do not use direct heat, and do not pour hot water over or rub the affected area.** Warming should be gentle and gradual. Failure to do this could lead to bleeding in the tissues and increase the possibility of infection. If the frostbite is deep, i.e. the affected area is frozen and hard to the touch, immediate medical attention should be obtained. The safe thawing of deep frostbite is beyond the expertise and facilities found on site.

14.9.5 Prevention of Cold Stress Disorders

During work in cold environments, the Team Leader/UXOSO will use the tailgate safety briefing to inform site personnel of the measures to be utilized in the prevention and control of cold stress. The Team Leader/UXOSO will also use meteorological data and Table 4 to inform site personnel of the combined temperature/wind chill affect to be expected during the day's activities. Prevention methods that site personnel will utilize include:

- Wear adequate, appropriately layered clothing, including a water repellant outer layer if precipitation is forecasted.
- Layered clothing should include, an innermost layer, such as cotton or silk to trap heat and absorb perspiration, an insulating layer (when working with static sensitive materials 100% cotton is recommended), a layer of work weight clothing, and an outer protective layer designed to be wind/water proof (when working with static sensitive materials 100% cotton is recommended).
- Wear a hat, gloves and socks that are insulated, to help retain body heat. (When working with static sensitive materials, 100% cotton is recommended.)
- Remove outer layers of clothing during breaks in heated shelters to prevent excessive sweating.
- In windy, cold conditions, cover all exposed skin.
- Eat well-balanced meals and maintain adequate intake of non-alcoholic, decaffeinated fluids.
- Seek shelter in a warm protected area when signs and symptoms of cold stress become evident.
- Protect clothing from getting wet, this includes keeping clothing from getting wet with sweat, so remove outer layers if work activities cause excessive sweating.

EOTI will assist in the prevention of cold stress by providing sheltered, warm areas where site personnel can rest and regain body heat during breaks. EOTI will also provide the following to assist site personnel in abating cold stress:

- Warm fluids, such as soup or de-caffeinated tea and cocoa, will be provided as needed.
- A minimum of one fifteen-minute break in a heated shelter every two hours.

NOTE - To date, there are no federally mandated regulations related to work/rest schedules. The fifteen-minute break every two hours is a recommended routine, but may not be adequate for all cold environments. The American Conference of Governmental Industrial Hygienist (ACGIH) has published a work/rest schedule, which is provided in Table 4 of this Section. However, this table only applies to, and should be implemented for, temperatures below 0°F. Therefore, for temperatures above 0°F, workers will be encouraged to seek shelter and rest in a warm area whenever they exhibit signs or symptoms of cold stress, as discussed previously.

Table 3

COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS EQUIVALENT TEMPERATURE

Estimated Wind Speed (in mph)	Actual Temperature Reading (° F)											
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**	**-50**	**-60**
	Equivalent Chill Temperature (° F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind speeds greater than 40 mph have little additional effect	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security				INCREASING DANGER Danger from freezing of exposed flesh within one minute				GREAT DANGER Flesh may freeze within 30 seconds			
	Trench foot and immersion foot may occur at any point on this chart.											

Table 4

TLV WORK/REST SCHEDULE FOR 4 HOUR WORK SHIFT *

Air Temp.	No Wind		5 MPH Wind		10 MPH Wind		15 MPH Win		20 MPH Wind	
°F Approx.	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-4° to -8°	Normal	1	Normal	1	Normal	1	Normal	1	Normal	1
-9° to -13°	Normal	1	Normal	1	Normal	1	Normal	1	75 min.	2
-14° to -18°	Normal	1	Normal	1	Normal	1	75 min.	2	55 min.	3
-15° to -19°	Normal	1	Normal	1	75 min.	2	55 min.	3	40 min.	4
-20° to -24°	Normal	1	75 min.	2	55 min.	3	40 min.	4	30 min.	5
-25° to -29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
-30° to -34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease			
-35° to -39°	40 min.	4	30 min.	5	Non-emergency work should cease					
-40° to -44°	30 min.	5	Non-emergency work should cease							
-45° & Below	Non-emergency work should cease									

1. Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up cycle in a warm location and with an extended break in a warm location (e.g. lunch) at the end of the 4-hours. For light-to-moderate work: apply the schedule one step lower.
2. The following is suggested as a guide for estimating wind velocity if other, more accurate means are not available: 5 mph - light flag moves; 10 mph - light flag fully extended; 15 mph - raises newspaper sheet; 20 mph - blowing and drifting snow.
3. This table applies only to acclimatized workers with appropriate dry clothing for winter work.

* Adapted from the "1993-1994 Threshold Limit Values and biological Exposure Indices, American Conference of Governmental Industrial Hygienist, Cincinnati, OH.

15.0 STANDARD OPERATING PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

Using common sense and following safe practices can reduce hazards due to normal site activities. Personnel must keep the prudent guidelines listed below in mind when conducting field activities.

- Hazard assessment is a continuous process. Personnel must be aware of their surroundings and constantly be aware of the MEC, chemical and physical hazards that are or may be present.
- The number of personnel in the exclusion zone will be the minimum number necessary to perform work tasks in a safe and efficient manner.
- Team members will be familiar with the physical characteristics of each site including wind direction, site access, and the location of communication devices and safety/emergency equipment.
- The location of overhead power lines and underground utilities must be established.
- Contact with potentially contaminated surfaces, walking through puddles or pools of liquid, kneeling on the ground, or leaning, sitting, or placing equipment on the contaminated soil should be avoided.
- Detection or appearance of unusual liquids, odors or discolored soil could indicate the presence of contaminants and should be reported to the Team Leader/UXOSO immediately.
- Site personnel are to report any other unusual or potentially hazardous condition to the Team Leader/UXOSO for investigation and/or corrective action.

All personnel on site will be required to follow the safe work practices contained in this Program, as they relate to the hazards encountered during site activities. All site personnel will be required to read, understand and comply with the provisions of this HASP. If new tasks or hazards are identified during site operations, which pose additional hazards, the HASP will be amended by the Health and Safety Manager to include additional safe work practices and other control methods as needed.

15.1 Use of Tools and Equipment

15.1.1 Power Tool Operation

By their very nature, power tools have the capability of inflicting serious injury upon site personnel if they are not used and maintained properly. To control the hazards associated with power tool operation, the requirements outlined in the safe work practices listed below shall be observed when using power tools:

- Operation will be conducted by authorized personnel familiar with the tool, its operation, and safety precautions.
- Power tools will be inspected prior to use, and defective equipment will be removed from service until repaired or replaced.
- Power tools designed to accommodate guards will have such guards properly in place prior to use.

- Loose fitting clothing or unrestrained long hair will not be permitted around moving parts of power tools.
- Hands, feet, etc. will be kept away from all moving parts.
- Maintenance and/or adjustments to equipment will not be conducted while it is in operation; the power will be disconnected prior to maintenance activities. All maintenance activities will be performed by personnel experienced and authorized to make the repairs, or it will be sent to the manufacturer for repair.
- An adequate operating area will be provided, allowing sufficient clearance and access for operation.
- Good housekeeping practices will be followed at all times.
- Safety glasses with side shields, goggles, or face shields shall be worn at all times while operating power tools or when working in the vicinity of operating power tools.

15.1.2 Hand Tool Operation

Use of improper or defective tools can contribute significantly to the occurrence of accidents on site. Therefore, the safe work practices listed below shall be observed when using hand tools:

- Hand tools will be inspected for defects prior to each use.
- Defective hand tools will be removed from service and repaired or discarded.
- Tools will be selected and used in the manner for which they were designed.
- Be sure of footing and grip before using any tool.
- Do not use tools that have split handles, mushroom heads, worn jaws, or other defects.
- Gloves will be worn whenever they increase gripping ability or if cut, laceration or puncture hazards may exist during the use of hand tools.
- Safety glasses with side shields, goggles, or a face shield will be used if tool use presents an eye/face hazard.
- Do not use makeshift tools or other improper tools.
- Use non-sparking tools where there are explosive vapors, gases, or residue.

15.2 Material Lifting

Many types of objects are handled in normal day to day operations. Care shall be taken in lifting and handling heavy or bulky items because they are the cause of many joint and back injuries. The following fundamentals address the proper lifting of materials to avoid joint and back injuries:

- The size, shape and weight of the object to be lifted must be considered. Site personnel will not lift more than they can handle comfortably.
- A firm grip on the object is essential; therefore the hands and object shall be free of oil, grease and water, which might prevent a firm grip.
- The hands and especially the fingers shall be kept away from any points that cause them to be pinched or crushed, especially when setting the object down.
- The item shall be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces and pinch points, and gloves shall be used, if necessary, to protect the hands.
- The feet shall be placed far enough apart for good balance and stability.

- Personnel will ensure that solid footing is available prior to lifting the object.
- When lifting, get as close to the load as possible, bend the legs at the knees, making sure that the back is kept as straight as possible.
- To lift the object, the legs are straightened from their bending position.
- Never carry a load that cannot be seen over or around.
- When placing an object down, the stance and position are identical to that for lifting, with the back kept straight, the legs bent at the knees and the object lowered.
- If the item to be lifted is too large, bulky, or heavy for one person to safely lift, ask a co-worker for assistance. If a piece of material handling equipment is available that can do the job, use the equipment instead of trying to lift it yourself.
- When two or more people are required to handle an object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each person, if possible, shall face the direction in which the object is being carried.

15.3 Sanitation Practices

Adequate sanitation facilities will be provided at each work site to ensure proper personal hygiene. Site sanitation will be established and maintained in accordance with OSHA 29 CFR 1910.120(n).

15.3.1 Potable Water Supply

An adequate supply of potable (drinkable) water shall be provided on site at all times, and will be supplied in accordance with the following provisions:

- Containers used for potable water shall be capable of being tightly closed, equipped with a tap and maintained in a clean and sanitary condition.
- A container used for distribution of drinking water shall be clearly labeled as to its contents and not used for any other purpose.
- Water shall not be dipped from the container and use of a common cup will not be allowed.
- Where single service cups are provided, separate sanitary containers will be provided for the storage of the unused cups and for the disposal of the used cups.

15.3.2 Non-potable Water

Outlets and storage containers for nonpotable water, such as water for fire fighting or decontamination will be clearly labeled to indicate that the water is not suitable for drinking, washing or cooking. There shall at no time be a cross connection or open potential between a system furnishing potable water and a system furnishing nonpotable water.

15.3.3 Toilet Facilities

Toilet facilities are being provided in buildings on site, which are located in the support zone. These are plumbed toilets with sinks available for washing of hands.

15.3.4 Washing Facilities

Hand and face washing facilities will be set up in the support zone of the work area. These will be utilized by all personnel exiting the exclusion zone prior to eating, drinking, tobacco use or other hand to face activities. Washing facilities will consist of potable running water, soap and drying towels. Portable eyewash will be available in site vehicles and the office trailer.

15.4 Site Housekeeping

All work areas will be maintained in a clean/neat fashion, free of loose debris and scrap. Any materials/equipment not being used will be removed and stored or disposed of accordingly. All work areas will be supplied with a trash receptacle with lid, the contents of which will be emptied daily.

15.5 Site Illumination

Conducting MEC operations in poorly illuminated conditions is inherently dangerous. As a general rule, personnel will only work during the hours of daylight, and no field activities will be scheduled during the period of thirty minutes before dusk to thirty minutes after dawn. There will be no MEC operations conducted during the hours of darkness unless specifically requested by the client and with sufficient lighting to attain a candlepower rating of 5-foot candles in the work zone. Work on this site is not expected to be conducted during hours of darkness.

15.6 Biological Hazards

Biological hazards, which are usually found on site, include insects, such as ticks, spiders, poisonous snakes and hazardous plants. Employee awareness and the safe work practices outlined in the following paragraphs should reduce the risk associated with these hazards.

15.6.1 Hazardous Plants

During the conduct of site activities the number and variety of plants that may be encountered is large and extensive. However the plants presenting the greatest degree of risk to site personnel (i.e.. potential for contact vs. affect produced) are those, which produce skin reactions and skin and tissue injury.

15.6.1.1 Plants Causing Skin and Tissue Injury

Contact with splinters, thorns and sharp leaf edges is of special concern to site personnel, as is the contact with the pointed surfaces found on branches, limbs and small trunks. This concern stems from the fact that punctures, cuts and even minor scrapes caused by accidental contact may result in non-infectious skin lesions, and the introduction of fungi or bacteria through the skin or eye. Personnel receiving any of the injuries listed above, even minor scrapes, shall report immediately to the Team Leader/UXOSO for initial and continued observation and care of the injury.

15.6.1.2 Plants Causing Skin Reactions

The poisonous plants of greatest concern are poison ivy and poison oak. Both poison ivy and poison oak thrive in all types of light and usually grow in the form of a trailing vine; however, it can also grow as a bush and can attain heights of 10 feet or more. Poison ivy has shiny pointed leaves that grow in clusters of three. Poison oak can have shiny or dull, pointed leaves that grow in clusters of three. Poison oak leaves are more rounded rather than jagged, and the underside of poison oak leaves are covered with hair.

The skin reaction associated with contacting these plants is caused by the body's allergic reaction to toxins contained in oils produced by the plant. Becoming contaminated with the oils does not require contact with just the leaves. Contamination can be achieved through contact with other parts of the plant such as the branches, stems or berries, or contact with contaminated items such as tools and clothing. The allergic reaction associated with exposure to these plants will generally cause the following signs and symptoms:

- Blistering at the site of contact, usually occurring within 12 to 48 hours after contact.
- Reddening, swelling, itching and burning at the site of contact.
- Pain, if the reaction is severe.
- Conjunctivitis, asthma, and other allergic reactions if the person is extremely sensitive to the poisonous plant toxin.

If the rash is scratched, secondary infections can occur. The rash usually disappears in 1 to 2 weeks in cases of mild exposure and up to 3 weeks when exposure is severe. Preventive measures, which can prove effective for most site personnel, are:

- Avoid contact with any poisonous plants on site, and keep a steady watch to identify, report and mark poisonous plants found on site.
- Wash hands, face or other exposed areas at the beginning of each break period and at the end of each workday.
- Avoid contact with, and wash on a daily basis, contaminated tools, equipment and clothing.
- Barrier creams, detoxification/wash solutions and orally administered desensitization may prove effective and should be tried to find the best preventive solution.
- Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.
- If burning of these plants occurs, make sure personnel are located upwind of the smoke, as inhalation of the smoke or contact with airborne particles from these plants can still cause a reaction to occur.

15.6.2 Snakes

When site activities are conducted in warm weather on sites that are located in wooded, grassy or rocky environments, the potential for contact with poisonous snakes becomes a very real danger. Normally, if a person is approaching a snake, the noise created by the person is usually sufficient to frighten the snake off. However, during the warm months, extreme caution must be exercised when conducting site operations around areas where snakes might be found (i.e. rocks, bushes, logs, or in holes, crevices, and abandoned pipes). If poisonous snakes are identified on site,

EOTI will issue protective clothing, such as snake leggings, to site personnel. The rules to follow if a snake bites someone are:

- **DO NOT** cut "Xs" over the bite area, as this will intensify the effect of the venom.
- **DO NOT** apply suction to the wound since this has a minimal effective in removing venom.
- **DO NOT** apply a tourniquet since this will concentrate the venom and increase the amount of tissue damage in the immediate area.
- If possible, try to get a good look at the snake so it can be identified for proper selection of anti-venom.
- **DO NOT** allow the victim to run for help since running increases the heart rate and will increase the spread of the venom throughout the body.
- Keep the victim calm and immobile.
- Have the victim hold the affected extremity lower than the heart while waiting for medical assistance. Do not delay evacuation.
- Transport the victim to medical attention immediately.

15.6.3 Tick Bites

The Centers for Disease Control (CDC) has noted the increase of Lyme Disease and Rocky Mountain Spotted Fever (RMSF) which are caused by bites from infected ticks that live in and near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a comma up to about one quarter inch. They are sometimes difficult to see. The tick season extends from spring through summer. When embedded in the skin, they may look like a freckle.
Lyme disease has occurred in 43 states, with the heaviest concentrations in the Northeast, the upper Midwest, and along the northern California coast. It is caused by deer ticks and the lone star ticks which have become infected with spirochetes. Female deer ticks are about one quarter inch in size, and are black and brick red in color. Male deer ticks are smaller, and completely black. Lone star ticks are larger and chestnut brown in color.

RMSF has occurred in 36 states, with the heaviest concentrations in Oklahoma, North Carolina, South Carolina, and Virginia. It is caused by Rocky Mountain wood ticks, and dog ticks which have become infected with rickettsia. Both are black in color.

The first symptoms of either disease are flu like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain. If immediately treated by a physician, most individuals recover fully in a short period of time. If not treated, more serious symptoms can occur.

If you believe a tick has bitten you, or if any of the signs and symptoms noted above appear, contact the Team Leader/UXOSO, who will authorize you to visit a physician for an examination and possible treatment.

15.6.3.1 Protective Measures

Standard field gear (work boots, socks and light-colored coveralls) provides good protection against tick bites, particularly if the joints are taped. However, even when wearing field gear, the following precautions shall be taken when working in areas that might be infested with ticks:

- When in the field, check yourself often for ticks, particularly on your lower legs and areas covered with hair.
- Spray outer clothing, particularly your pant legs and socks, **BUT NOT YOUR SKIN**, with an insect repellent that contains permethrin or permanone. Apply deet (vapor-active repellent) to any exposed skin surface (except eyes and lips), and apply permethrin repellent spray to field clothing. Allow the pertmethrin to dry before using treated clothing. The repellent system, deet and permethrin, offer maximum protection.
- When walking in wooded areas, wear a hard hat, and avoid contact with bushes, tall grass, or brush as much as possible.
- If you find a tick, remove it by pulling on it gently with tweezers.
- If the tick resists, cover the tick with salad oil for about 15 minutes to asphyxiate it, then remove it with tweezers.
- **DO NOT** use matches, a lit cigarette, nail polish or any other type of chemical to "coax" the tick out.
- Be sure to remove all parts of the tick's body, and disinfect the area with alcohol or a similar antiseptic after removal.
- For several days to several weeks after removal of the tick, look for the signs of the onset of Lyme disease, such as a rash that looks like a bulls-eye or an expanding red circle surrounding a light area, frequently seen with a small welt in the center.
- Also look for the signs of the onset of RMSF, such as an inflammation which is visible in the form of a rash comprising many red spots under the skin, which appears 3 to 10 days after the tick bite.

15.6.4 Bees, Hornets and Wasps

Contact with stinging insects like bees, hornets and wasps may result in site personnel experiencing adverse health affects that range from being mildly uncomfortable to being life threatening. Therefore, stinging insects present a serious hazard to site personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. Some of the factors related to stinging insects that increase the degree of risk associated with accidental contact are as follows:

- The nests for these insects are frequently found in remote wooded or grassy areas.
- The nests can be situated in trees, rocks, and bushes or in the ground, and are usually difficult to see.
- Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active.
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention.
- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock.
- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth and respiratory passages.

- The hypersensitivity needed to cause anaphylactic shock, can in some people, accumulate over time and exposure, therefore even if someone has been stung previously, and not experienced an allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again.

With these things in mind, and with the high probability of contact with stinging insects, all site personnel will comply with the following safe work practices:

- If a worker knows that he is hypersensitive to bee, wasp or hornet stings, he must inform the Team Leader/UXOSO of this condition prior to participation in site activities.
- All site personnel will be watchful for the presence of stinging insects and their nests, and will advise the Team Leader/UXOSO if a stinging insect nest is located or suspected in the area.
- Any nests located on site will be flagged off and site personnel will be notified of its presence.
- If stung, site personnel will immediately report to the Team Leader/UXOSO to obtain first aid treatment and to allow the Team Leader/UXOSO to observe them for signs of allergic reaction. If a breathing emergency (anaphylactic shock) occurs as a result of the sting, immediately call 911.
- Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times, and will let the Team Leader/UXOSO and co-workers know where it is kept.

15.6.5 Spiders

A large variety of spiders may be encountered during site activities. While most spider bites merely cause localized pain, swelling, reddening and in some cases, tissue damage, there are a few spiders that, due to the severity of the physiological affects caused by their venom, are dangerous. These species include the black widow and the brown or violin spiders.
The black widow is a coal-black bulbous spider about ¾-inch in length, with a bright red hourglass on the under side of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or minor burning at the time of the bite.
- Appearance of small punctures (but sometimes none are visible).
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities.

The brown or violin spider is brownish to tan in color, rather flat, about 5/8-inch long with a dark brown “violin” shape on the top. Of the brown spider, there are three varieties found in the United States, which present a problem to site personnel. These are the brown recluse, the desert violin and the Arizona violin. These spiders may be found in a variety of locations including

trees, rocks or in dark locations. Victims of a brown or violin spider bite may exhibit the following signs or symptoms:

- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite.
- Formation of a large, red, swollen, postulating lesion with a bull's-eye appearance.
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting.
- Pain may become severe after 8 hours, with the onset of tissue necrosis.

There is no effective first aid treatment for either of these bites. Except for very young, very old or weak victims, these spider bites are not considered to be life threatening; however, medical treatment must be sought to reduce the extent of damage caused by the injected toxins.
If either of these spiders are suspected or known to be on site, the Team Leader/UXOSO will brief site personnel as to the identification and avoidance of the spiders. As with stinging insects, site personnel shall report to the Team Leader/UXOSO if they locate either of these spiders on site or notice any type of bite while involved in site activities.

15.6.6 Hantavirus Pulmonary Syndrome (HPS)

15.6.6.1 Basic Transmission Cycle – some rodents are infected with a type of Hantavirus that causes HPS. In the United States, deer mice (plus cotton rats and rice rats in the southeastern states and the white-footed mouse in the Northeast) are the rodents carrying hantaviruses that cause hantavirus pulmonary syndrome. Common house mice do not carry Hantavirus.

These rodents shed the virus in their urine, droppings and saliva. The virus is mainly transmitted to people when they breathe in air contaminated with the virus. This happens when fresh rodent urine, droppings or nesting materials are stirred up. When tiny droplets containing the virus get into the air, this process is known as aerosolization.
There are several other ways rodents may spread Hantavirus to people:

- If a rodent with the virus bites them, the virus may be spread this way – but this is very rare.
- Researchers believe that you may be able to get the virus if you touched something that had been contaminated with rodent urine, droppings, or saliva, and then touched your nose or mouth.
- Researchers also suspect that if virus-infected rodent urine, droppings or saliva contaminates food that you eat, you could also become sick.

15.6.6.2 Symptoms of HPS

Early symptoms include fatigue, fever, and muscle aches, especially the large muscle groups – thighs, hips, back, sometimes shoulders. These symptoms are universal. There may also be headaches, dizziness, chills and/or abdominal problems, such as nausea, vomiting, diarrhea and abdominal pain. About half of all HPS patients experience these symptoms.

How long could it be between the time you get the virus, and the time you start showing these symptoms? Because there have been so few cases of HPS, it is not quite clear what this "incubation time" is. However, it appears right now that it may be between one to five weeks after you are exposed to potentially infected rodents and the rodent's droppings before you will show any symptoms.

Late symptoms – 4-10 days later – symptoms include coughing and shortness of breath, with the sensation of, as one survivor put it, a "tight band around my chest and a pillow over my face" as lungs fill with fluid.

MINIMIZE RISK - do not disturb rodents, burrows, or dens.

15.6.6.3 Preventive Measures

If there are signs of a rodent nest or rodent droppings, make it known to the Team Leader/UXOSO. To clean and disinfect the area, spray a disinfectant on the area and leave a waiting time of 20 minutes. Then clean it up using rubber or plastic gloves, coveralls, rubber boots or disposable shoe covers, protective goggles, and a half-face mask air-purifying respirator with a high-efficiency particulate air (HEPA) filter. Bag the cleaning materials and dispose of it. Then, re-clean the area with disinfectant.

15.6.7 Mosquitoes

Mosquitoes are responsible for transmitting diseases such as malaria and West Nile Virus through bites to the skin. While malaria is much more contagious, it is not normally found in North America. West Nile virus is commonly found in Africa, West Asia and the Middle East. In recent years, West Nile virus has been increasingly found in the continental United States. It is believed to have first appeared in the United States in 1999. It is most common in late summer or early fall, which is the active season for mosquitoes, but in warmer southern climates where the temperatures are milder, West Nile virus can be transmitted year round.

15.6.7.1 Transmission Cycle

Mosquitoes become infected with the virus when they feed on infected birds, which may circulate the virus in their blood for a few days. Infected mosquitoes can then transmit the virus to humans and animals while biting to take blood. The virus is located in the mosquito's salivary glands, and may be injected into the animal or human, where it can multiply, possibly causing illness. Even in areas where the virus is circulating, few mosquitoes are infected with the West Nile virus. Even if the mosquito is infected, less than 1% of people who get bitten and become infected will get seriously ill. The majority of cases of West Nile virus have been identified in birds, it has also been found in horses, cats, bats, chipmunks, skunks, squirrels, and domestic rabbits. Once West Nile virus has been contracted, the survivor of this illness is believed to carry a lifelong immunity to it. At this time there is no vaccine against West Nile virus.

15.6.7.2 Symptoms

West Nile virus is an encephalitis, which causes an inflammation of the brain. Following transmission by an infected mosquito, West Nile virus multiplies in the person's blood system and crosses the blood-brain barrier to reach the brain. The virus interferes with normal central nervous system functioning and causes inflammation of the brain tissue. Fatality rates range from 3%-15% of persons who develop severe illness, and rates are highest among persons over 50 years of age and those with weakened immune systems. This disease is not transmitted from person-to-person, so touching or working in the vicinity of someone with the disease will not increase the risk.

The incubation period for West Nile virus is normally 3-15 days. Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

If symptoms develop, seek medical attention immediately.

15.6.7.3 Preventive Measures

Prevention and control of West Nile virus is most effectively accomplished through vector management programs. Be alert for dead animals on the site, particularly birds. If a dead bird or other animal is found on site, bare-handed contact should be avoided. Using gloves or double plastic bags, wrap animal and call the Health Department. If the Health Department wants to test the bird, they will come and pick it up. If they are not testing the bird, it should remain wrapped in the plastic and disposed of in accordance with established procedures.

Other ways of reducing risk of becoming infected with West Nile Virus include:

- Implement mosquito control measures on the site.
- Make sure that there are no open containers of standing water on the site in which mosquitoes can breed.
- Wear long sleeved shirts and long pants while outdoors.
- Stay indoors at dawn, dusk, and in the early evening when mosquitoes are most active.
- Spray clothing with repellants containing permethrin or DEET.
- Apply insect repellant sparingly to exposed skin. An effective repellant will contain 35% DEET. Higher concentrations of DEET provide no additional protection. Always read the manufacturer's directions on the repellant prior to applying it to the skin.
- Vitamin B and "ultrasonic" devices are NOT considered to be an effective deterrent to mosquito bites.

15.6.7.4 Treatment

If symptoms have developed that are consistent with West Nile virus, a blood sample will be taken and sent for analysis. There is currently no specific therapy. In more severe cases, intensive supportive therapy is indicated, normally involving hospitalization, intravenous fluids, airway management, respiratory support (ventilator), prevention of secondary infections (pneumonia, urinary tract, etc.) and nursing care.

15.7 MEC

MEC may be present and located during site activities. UXO qualified personnel will follow the requirements of the EOTI Safety Program, and the Basic Safety Concepts and Considerations for Ordnance and Explosives Operations, which outline the safety and health precautions to be taken if MEC are encountered and/or destroyed. All non-UXO qualified personnel will follow the safe work practices listed below:

- Non-UXO qualified personnel will receive site specific MEC recognition training prior to participation in site activities.
- No soil penetrating activities will be allowed without the area first being cleared by UXO qualified personnel.
- Non-UXO qualified personnel will be escorted on site by UXO qualified personnel, until such time as the area is cleared.
- Once an area has been cleared and flagged, non-UXO qualified personnel may perform duties in the area unescorted, but shall not leave the cleared area unescorted.
- Non-UXO qualified personnel will not touch or disturb any object which could potentially be MEC related, and will immediately notify the nearest UXO qualified person of the presence of the object.
- Should personnel not associated with the project operations need to enter the exclusion zone in order to gain access to the area, it will be coordinated with the Military Police, who have control of the access road. All MEC operations will halt for the duration of time the person is within the exclusion zone. Once they have departed the area, MEC operations may resume.
- MEC disposal operations will be performed by the Navy EOD

16.0 LOGS, REPORTS AND RECORD KEEPING

16.1 Training Logs

Each person on the site will have an individual file folder, which contains a copy of the following:

- 40 hr HAZWOPER Certificate.
- Current 8 hr HAZWOPER Annual Refresher Certificate.
- 8 hr HAZWOPER Supervisor Certificate, if applicable.
- EOD Training Certificate
- Any other applicable training certificates.

Personnel folders will be maintained by the Team Leader/UXOSO on-site. Training/Tailgate Safety Record will be completed for all on-site training. The Team Leader/UXOSO will maintain the file, which will be made available for the client as requested. This form may be completed in ink, but it is preferred that it be completed with a computer in Word.

16.2 Daily Safety Inspection Logs

The Team Leader/UXOSO will perform daily inspections on a scheduled and non-scheduled basis, of all site operations. The Team Leader/UXOSO will conduct non-scheduled safety and health inspections as deemed appropriate based upon the ongoing site activities. Scheduled safety and health inspections will be conducted as outlined below. All inspections will be documented. When discrepancies are observed, follow-up will be documented in the Team Leader/UXOSO log until the corrective actions required have been completed.

AREA	FREQUENCY
Sanitation	Daily
Medical and First Aid	Daily
Temporary Facilities	Weekly
Personal Protective and Safety Equipment	Daily
Hazardous Substances, Agents, and Environments	Weekly
Lighting	Monthly
Accident Prevention Signs, Tags, Labels, and Signals and Piping System Identification	Monthly
Fire Prevention and Protection	Weekly
Hand and Power Tools	Daily, if applicable
Material Handling, Storage and Disposal	Weekly
Machinery and Mechanized Equipment	Daily, if applicable
Motor Vehicles	Daily
Safe Access and Fall Protection	Weekly, if applicable
HTRW	Daily, if applicable

16.3 Visitor Log

The Visitor's Log will be maintained by the Team Leader/UXOSO. The log will document the visitor's name, company name, date, time, and reason for visit. There will also be documentation that the visitor was given a visitor safety briefing prior to being permitted to enter

the EZ of the site. Visitors will be escorted at all times within the EZ and MEC operations will cease during the time they are within the EZ.

16.4 Medical Surveillance Records and Certifications

A copy of the Physician Statement from a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine, regarding the current annual HAZWOPER physical examination will be maintained in the personnel folder with the other HAZWOPER certificates.

16.5 Site Monitoring Results

All site-monitoring results will be documented. This will be kept in a file at the project site for reference, and will become a part of the permanent site record at the conclusion of site activities. At this site, heat exposure monitoring is the only monitoring anticipated to occur, and that is dependent upon the site temperature.

16.6 Accident Reporting Records

Should an accident occur on the site, all reports and records will be documented. Copies will be maintained on site for the duration of site activities. A permanent copy will be maintained in the Oak Ridge EOTI Office.

17.0 PRE-ENTRY BRIEFINGS

As detailed in the training section of this Health and Safety Plan, the Team Leader/UXOSO will conduct daily tailgate safety briefings prior to the start of operations. These briefings will cover the operations expected to be performed that day including particular safety and health concerns, explosive safety issues, personal protective equipment issues, expected weather conditions, etc. These briefings are documented daily in the Documentation of Training forms. Additional briefings may be required based on unanticipated hazards at the site.

Visitor briefings will be given for all visitors to the site who plan to enter the exclusion zone. These briefings will include MEC recognition and hazards, emergency procedures, site safety and health requirements, etc. These briefings will be documented.

18.0 INSPECTION PROGRAM

As detailed in section 16.2 of this Health and Safety Plan, the Team Leader/UXOSO will be conducting daily safety and health inspections on this site covering all issues of this HASP. All inspections will be documented and any findings or discrepancies will be reported and tracked to completion. In situations involving imminent danger to personnel, operations would be

immediately stopped, supervisors contacted, and the problem will be resolved prior to starting operations back up again.

19.0 COMMUNITY AIR MONITORING PLAN

As work involving the removal of MEC from the ground does not involve the release of hazardous chemicals into the atmosphere, chemical monitoring will not be required for EOTI's work on this project.

Appendix E
MEC Notification Procedures

Procedures for Communicating Potentially Live MEC to Navy

The following are procedures designed to effectively communicate the finding of potentially live munitions and explosives of concern (MEC) that could be encountered during investigative, avoidance and / or remedial work at St. Juliens Creek Annex (SJCA). Communicating in a fast, accurate, and calm manner is critical in keeping the situation under control. During all intrusive investigations, a qualified EOTI UXO Technician with expertise and knowledge in dealing with MEC will be on-site. Only the EOTI UXO Technician will determine whether an item is considered live or inert. If the EOTI UXO Technician can not make a determination regarding the found item or if the item is determined to be live, the following steps should be taken:

1. Stop all work. Under no circumstances should work continue near the item (Norfolk Naval Shipyard [NNSY] security typically does not permit any work to occur at a site even if it is some distance away from the item).

2. Contact the NNSY Security dispatcher at (757) 396-5111. If the field team lead reports to the NNSY he / she should discuss the situation with the EOTI UXO Technician prior to making the call. It is imperative to communicate whether the situation is an emergency, that activities have stopped, and that people will not have access to the area.

3. Immediately following notification to NNSY Security, a phone call should be placed to the JV I activity manager/project manager. The JV I activity manager/project manager will be responsible for contacting the NAVFAC Mid-Atlantic project manager Ms. Agnes Sullivan @ 444-4120.

4. If the project is a construction project that includes the NNSY Resident Office In Charge Of Construction (ROICC), contact the ROICC office at (757) 396-5121.

5. From the moment that NNSY security arrives, they are in charge and there are no exceptions.

6. Naval Ordnance Safety & Security Activity (NOSSA) will be notified by in accordance with Navy policy.

The EOTI UXO Technician will review and as necessary, discuss this procedure with JVI, the Navy, and other contractors working on the site

Appendix F
Environmental Protection Plan

Draft

Environmental Protection Plan
Site 19 Removal Action

St. Juliens Creek Annex
Chesapeake, Virginia

Task Order 059

January 2006

Prepared for

Department of the Navy
NAVFAC
Mid-Atlantic

Under the

AGVIQ/CH2M HILL JV I Program
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Prepared by

AGVIQ
AGVIQ ENVIRONMENTAL SERVICES
CH2M HILL
JOINT VENTURE

Virginia Beach, Virginia

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
COE	Corps of Engineers
EC	Emergency Coordinator
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
HSO	Health and Safety Officer
HSP	Health and Safety Plan
JV I	Joint Venture I
NAVFAC	Naval Facilities Engineering Command
NNSY	Norfolk Naval Shipyard
PAH	polycyclic aromatic hydrocarbon
RBC	Risk Based Concentration
ROICC	Resident Officer in Charge of Construction
SJCA	St. Juliens Creek Annex
UTL	Upper Tolerance Limit

SECTION 1

Description

AGVIQ-CH2M Hill Joint Venture I (JV I) has been contracted by the Department of the Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic to conduct a removal action at Site 19 at St. Juliens Creek Annex (SJCA) located in Chesapeake, Virginia (Figures 1-1 and 1-2). A detailed description of the facility and site and the work activities for this task order is presented in the Work Plan. This site specific Environmental Protection Plan (EPP) has been prepared as a guidance document. Therefore, this site specific EPP will only provide information relevant for this project.

1.1 Overview

This site specific EPP will only contain project specific information. This information will include the following:

- Purpose
- Facility location and background
- Organizational chart
- Materials inventory and compatibility
- Emergency and decontamination equipment
- Site evacuation plan
- Spill prevention and response
- External factors
- Protection of natural resources
- Erosion and sediment controls
- Controls and Disposal of solid and hazardous waste
- Dust control and erosion protection
- Potential spill sources and prevention practices
- Preventative Actions

1.2 Purpose

The purpose of this EPP is to present information required to minimize the hazards to human health and the environment from fires, explosions, spills, releases of organic vapors, or any unplanned or sudden release of constituents of concern. This plan fulfills the requirements of the Task Order 059 and is in accordance with:

- Code of federal regulations (CFR) 29 1910-subpart G: Occupational Health and Environmental Control
- 40 CFR 261: Identification and listing of hazardous waste
- 40 CFR 262: generators of hazardous waste
- 40 CFR 263: Transporters of hazardous waste

- 40 CFR 264: Owners and operators of hazardous waste treatment, storage, and disposal facilities
- 49 CFR 178: Shipping container specification
- Corps of Engineers (COE) EP-1165-2-304: 1976 Flood plain management
- 1992 Virginia Erosion and Sediment Control Handbook

The plan establishes guidelines which will be followed during site activities and used in conjunction with other plans and docume

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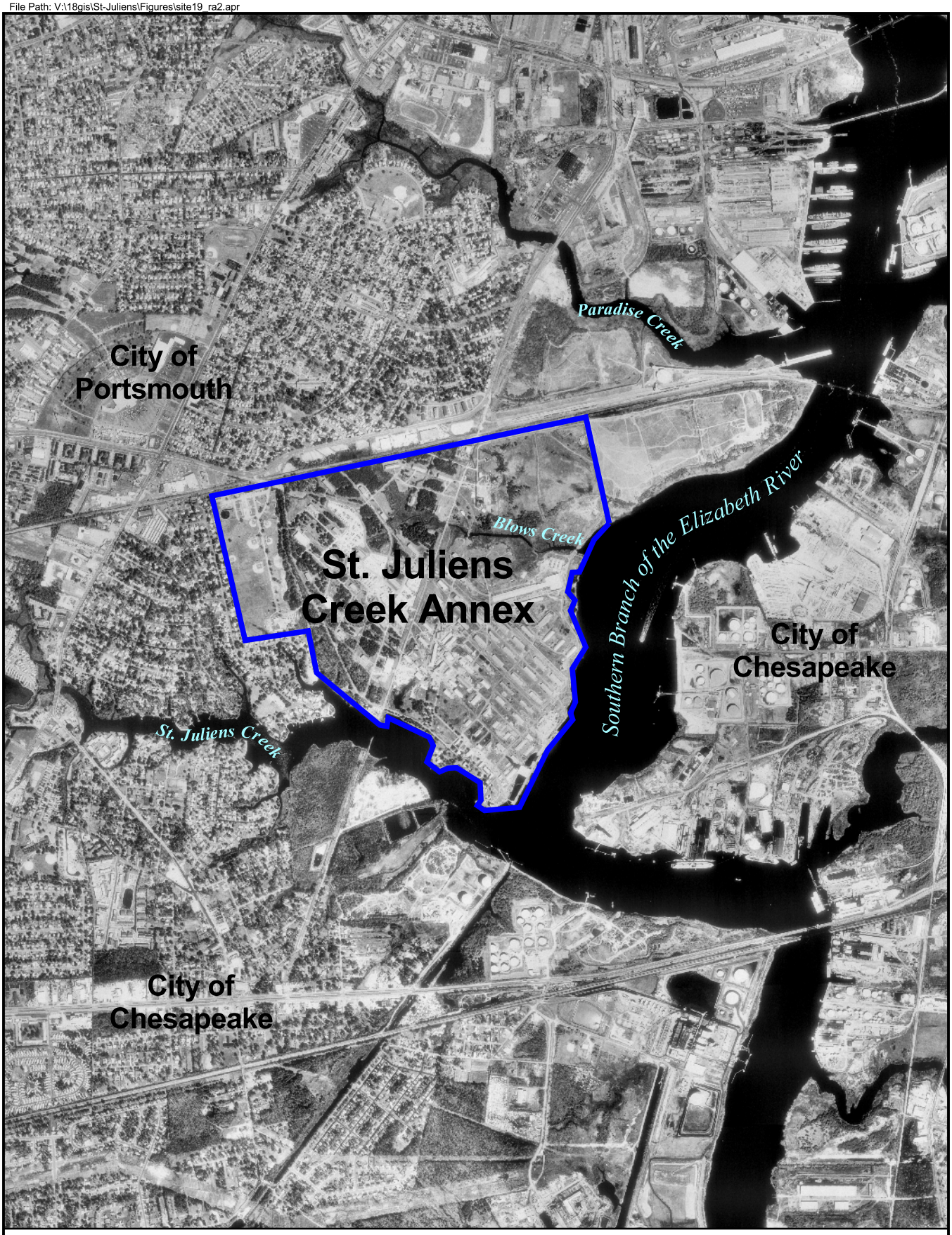

LEGEND

St. Juliens Creek Annex

N

0 1000 2000 3000 Feet

Figure 1-1
Location of St. Juliens Creek Annex
St. Juliens Creek Annex
Chesapeake, Virginia

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LEGEND

Site Location

Facility Boundary

N

0 500 1000 1500 Feet

Figure 1-2
Location of Site 19
St. Juliens Creek Annex
Chesapeake, Virginia

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SECTION 2

Organizational Structure

This section describes the personnel and required chain of command that will control and direct environmental protection activities at the site.

2.1 Responsible Parties

The U.S. Navy is the Owner of the project site and the responsible party for the removal activities. The Navy has contracted JV I to perform removal action. Throughout the duration of the removal action, JV I will notify the Navy of any environmental protection incident as soon as possible. For all spills JV I will immediately contact the Facility Fire Response at (757) 396-3333. The Navy is responsible for all notifications to local, state, and federal authorities.

JV I is responsible for implementing environmental protection procedures and is responsible for all information contained in this document and as described in the Health and Safety Plan (HSP) found as Appendix A of the Work Plan.

2.2 Emergency Services

A summary of local and state emergency service agencies are listed in the HSP. Norfolk Naval Ship Yard (NNSY) holds control of all security, fire, and ambulatory services for St. Juliens Creek Annex. Individual emergency agencies and responsibilities are as follows.

2.2.1 Police

The Security Department will provide police support for blocking traffic and other related duties during environmental protection situations. Unlawful entry into the project site will also be reported to Security. The phone numbers for the Security Department are (757) 396-5111.

2.2.2 Fire Protection Division

All environmental protection situations requiring Fire Protection Division personnel and equipment will be reported to the local Fire Protection Division at (757) 382-6297.

2.3 Coordination Responsibilities

All environmental protection provisions will be implemented by means of JV I's emergency coordinator organizational structure (Figure 2-1). JV I is responsible for coordination, training, drills, notification to the Navy, and other aspects of the EPP.

2.3.1 Project Manager

The Project Manager is ultimately responsible for completion of the project in accordance with the plans. The Project Manager delegates the authority for the implementation, maintenance, and compliance of the project activities on site to the project site staff. The Site Superintendent is

responsible for the overall operations on site, including safety of the site. The Health and Safety Officer has been delegated to implements this document and the HSP. In the absence of the Health and Safety Officer, responsibility reverts to the Site Superintendent.

2.3.2 Site Superintendent

The Site Superintendent is responsible for field implementation of the environmental procedures and the health and safety program. When the HSO officer is on site, that responsibility is delegated to the HSO. The Site Superintendent's responsibility includes advising site workers of the specific health and safety requirements and consulting with the HSO regarding appropriate changes to the environmental protection section and the HSP.

2.3.3 Health and Safety Officer

The HSO will be responsible for all environmental health and safety activities including air monitoring activities, overseeing the decontamination of equipment and clothing, decontamination procedures and emergency response procedures. The HSO will also be responsible for training of on-site personnel as may be necessary. The HSO has the authority to stop any operation that threatens the health and/or safety of the team or surrounding populace. The weekly environmental protection inspections and daily health and safety activities may be conducted by the HSO or the Site Superintendent. The Site Superintendent is responsible for assuring that the daily environmental protection is performed.

2.3.4 Emergency Coordinator

The Emergency Coordinator (EC) will implement and coordinate all environmental procedures during spills and releases. During an emergency, the EC will activate alarm systems, notify the Fire Protection Division, notify the Resident Officer In Charge of Construction (ROICC), identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation. The HSO will serve as the EC when on site. In the event the HSO is not on site, the Site Superintendent will serve as the EC. The EC will also be responsible for follow-up activities after the incident, such as treating, storing, or disposing of residues and impacted soil, decontamination and maintenance of emergency equipment, and submission of any reports. The EC is also responsible for personnel training and evacuation drills. The EC will be on-site during all operations.

2.3.5 Site Personnel

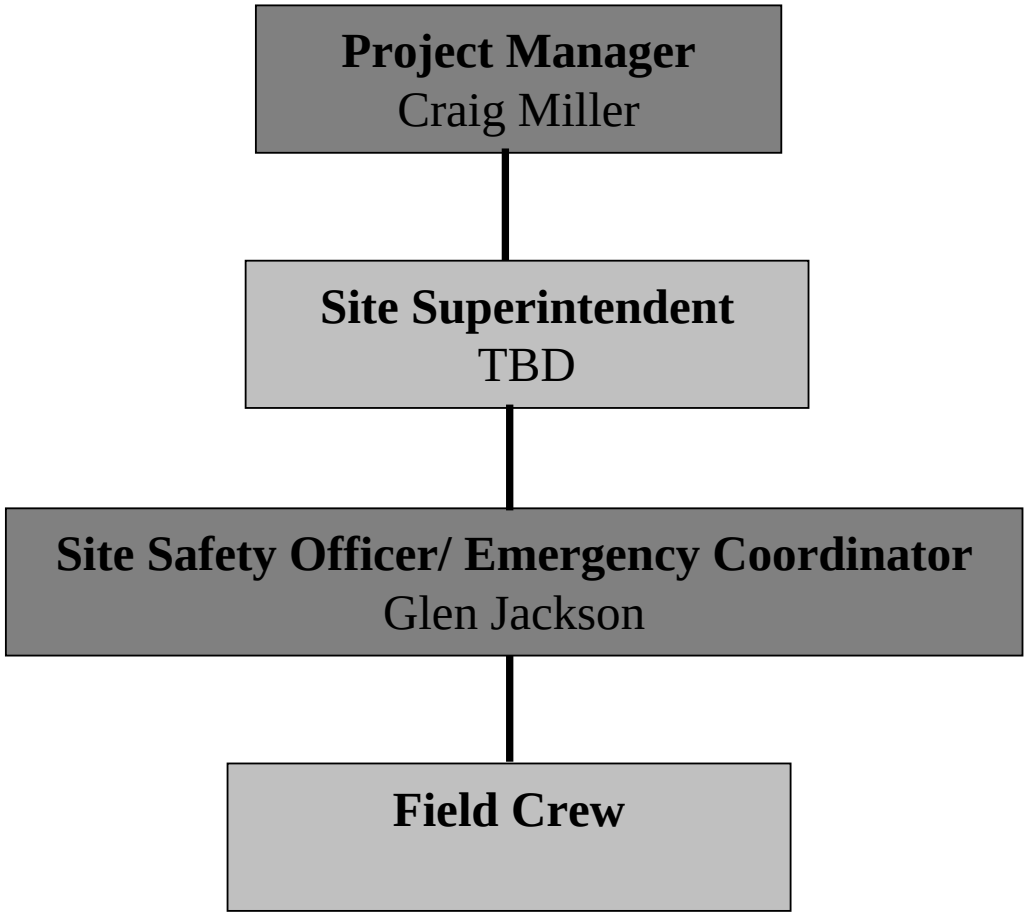
All personnel will be responsible for working in a safe and healthy manner. They will be required to comply with all applicable local, state, and federal rules and regulations, as defined in the HSP

Figure 2-1

Emergency Coordinator Organizational Chart

Site 19 Removal Action, St. Juliens Creek Annex

Task Order 059



SECTION 3

Materials Inventory Compatibility

This section contains information regarding the materials that may be involved in a spill or release. Table 3-1 lists quantities of the materials present on-site by their type.

3.1 Current Site Conditions

Several inorganics have been detected in the surface soils in the Metallic Slag Area. Of the detections, several (antimony, barium, chromium, copper, iron, lead, manganese, nickel, silver, and zink) exceeded background upper tolerance limit (UTL) at one or more location. Antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, and vanadium exceeded Environmental Protection Agency (EPA) Region III Risk Based Criteria (RBCs) for residential use at one or more locations. Specific concentrations and related information are provided in the HSP (Appendix A of the Work Plan).

In the Elevated Subsurface Polycyclic Aromatic Hydrocarbons (PAHs) Area, several PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) exceeded background UTLs and EPA Region III RBCs for residential use. Specific concentrations and related information are provided in the HSP (Appendix A of the Work Plan).

3.2 Fuel and Flammable Liquids

To perform the project activities, JV I will have fuels and oils on site for construction vehicles. The types of materials that may be stored at the fuel depot are as follows:

- Diesel fuel
- Gasoline
- Motor transmission oils
- Greases
- Used oil
- Hydraulic fluid

3.3 Other Materials of Concern

Other materials necessary to complete the project that have the potential for spills and releases are listed below. The exact quantity and type of these materials will be determined during remedial activities:

- Agricultural lime
- Fertilizer

These materials will be used as landscaping materials during the restoration period.

3.4 Material Compatibility

The materials mentioned in Sections 3.1 to 3.3 are not anticipated to be mixed or combined during site operations, and will be stored so as to prevent accidental mixing in the event of a spill/release.

Table 3-1
Material Inventory

Material	Unit	Quantity	Location	Hazard Class
Impacted Soil	Cubic Yard	160(1)	Metallic Slag Area	N/A
Impacted Soil	Cubic Yard	200(1)	Elevated Subsurface PAHs Area	N/A
Gasoline	Gallons	(2)	Project Support Area	Flammable
Lime, Fertilizer	Pounds	(2)	Project Support Area	Corrosive
Motor Transmission Oils	Gallons	(2)	Project Support Area	Flammable
Greases	Tubes	(2)	Project Support Area	Flammable
Hydraulic Fluid	Gallons	(2)	Project Support Area	Flammable

Notes: (1) Estimated
(2)Ongoing activity. Quantities to be determined during construction activities.

SECTION 4

Emergency and Decontamination Equipment

This section discusses the types of emergency equipment to be used in the event of a spill or other emergency situation.

4.1 Small-Scale Emergency Equipment

Small-scale emergency equipment will include the following:

- Dry chemical, ABC-rated fire extinguishers
- Spill control equipment
- Absorbent materials
- Decontamination equipment
- Radio and telephone equipment
- Various hand tools

This equipment will be made accessible to all on-site workers. Locations of such equipment will be posted at the JV I office trailer. A list of the small equipment is provided in Table 4-1.

4.2 Large-Scale Emergency Equipment

Large-scale emergency equipment will include the same equipment used in the ongoing construction activities. The equipment will include a bulldozer and an excavator if equipment of such size is necessary. Other emergency equipment may be obtained from the local Fire Protection Division or other emergency response agencies, if required. A list of large equipment proposed for on-site use is provided in Table 4-1.

4.3 Decontamination Equipment

Equipment necessary for decontamination activities will be provided, installed, and verified in working order prior to any site operations. Equipment for the decontamination area includes the following items:

- Clean water supply
- Detergent solution
- Containers for used decontamination solution and decontamination residues/solids
- Brushes
- Waste container

Table 4-1
Equipment List

Equipment	Use	Location
LARGE EQUIPMENT:		
Excavator		
Dozer		
Pickup Truck		
SMALL EQUIPMENT:		
Absorbent Materials		
Basket Stretchers		
Camera/Photo Equipment		
Decontamination Equipment with a Clean Water Supply (70-80°F)		
First-Aid Supplies		
ABC-Rated Portable Fire Extinguishers		
2-Way Radios		
Generator - 5kW		
Photoionization Detector		
Ditchwitch		
Pressure Washer - 2,000 psi		

Note: (1) ABC-rated portable fire extinguishers to include one 20-pound unit per site support area, one 10-pound unit in each piece of mobile equipment, and one 20-pound unit at each major mechanical operation.

SECTION 5

Site Evacuation Plan

This section details the procedures to be followed in the event that the site needs to be evacuated.

5.1 Site Evacuation Signal

All site personnel, including equipment operators, technicians, and supervisors, will evacuate the site upon hearing the evacuation signal. The signal will consist of a continuous blast from an air horn. The blast will be at least 15 seconds in duration, and will be sounded from a location that broadcasts clearly to the entire site. The signal will be repeated at least two times to alert all personnel. Radio base station personnel will also broadcast a verbal evacuation command over the site channel to alert operators who may not hear the air horn signal. A visual signal (clutching the throat with the hands) will indicate a site evacuation.

5.2 Site Evacuation Routes

After the evacuation signal is sounded, all personnel will immediately proceed to the predetermined meeting point upwind of the site. Radio contact will be maintained with all management staff. All attempts to reach the upwind meeting location must be taken. All equipment, trucks, and other internal combustion engines will be shut down prior to personnel evacuation if the equipment can be reached without risking personal safety. The evacuation route will be the most direct route to the meeting point. Figure 5-1 shows site evacuation locations.

The EC will contact the Fire Protection Division and the ROICC to inform them of the nature and extent of the emergency. A meeting point coordinator will be chosen at the meeting point. This person will be the most senior person (e.g., Site Superintendent, HSO, EC, foreman, or other supervisor) at the location. The meeting point coordinator will follow actions described in Section 5.3.

5.3 Post-Evacuation Actions

A head count of personnel assembled at the meeting point will be taken by the meeting point coordinator after the evacuation and provided to the EC. Information regarding missing and/or injured personnel will be brought to the immediate attention of the meeting point coordinator. No personnel will attempt to re-enter the site at this time. The EC or appointed representative will coordinate activities with the Navy. After the emergency has been resolved, the EC will indicate when personnel can enter the site and resume work.

5.4 Site Evacuation Drill

All site personnel must be familiar with the evacuation signal and evacuation procedures prior to any site operations. The evacuation plan will be executed during an announced drill within 2 days after major activities (i.e., excavation) have begun at the site. The EC will announce the drill time to all site personnel and will notify the Navy authorities as to the nature and time of the drill. The drill will include contacting authorities to verify communication procedures.

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- Extent of PAH Removal (Area = 1,084 sq.ft.)
- Extent of Metallic Slag Removal (Area = 2,866 sq.ft.)
- Site Boundary
- Wind Direction
- Evacuation Location

N

0 35 70 Feet

Figure 5-1
Evacuation Location
Site 19
St. Juliens Creek Annex
Chesapeake, Virginia

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SECTION 6

Protection of Natural Resources

The JV I will preserve the natural resources within the project boundaries and outside the limits of permanent work. The site will be restored to an equivalent or improved condition upon completion of work. JV I will confine construction activities to within the limits of the work indicated or specified. This section describes the techniques that will be utilized to protect natural, historical, and archeological resources.

No historical or archaeological items are believed to be present at Site 4, however if any items are discovered during the remedial action, all items will be protected in place and reported immediately to the ROICC. Work will be stopped in the immediate area of any discovery until directed by the ROICC to resume work. The Government will retain ownership and control over any historical and archaeological resource encountered at the site.

SECTION 7

Preventative Action

This section discusses the preventative measures that will be utilized to minimize the possibility of a spill or discharge.

7.1 Inspection

Inspections of site areas will be performed by JV I's Site Superintendent to verify that procedures for proper storage, handling, and transport of materials are being followed. Inspection and monitoring methods will be through visual observation. Monitoring equipment as described in Section 8.0 will be used when necessary. Such areas include the following:

- Excavation areas
- Fuel depots – various fuels and oils.

Other areas and items that will be monitored include:

- Effectiveness of housekeeping practices
- Staging areas
- Proper placards and labeling of truck contents.

7.2 Equipment Maintenance

All construction equipment will be properly maintained to facilitate safe operation. Equipment (especially trucks) will be properly maintained to minimize spillage or leakage that may occur during on-site transport operations. Maintenance of heavy equipment is performed by the equipment vendor who is disposing of waste oil. Spill kits will be ready and available during all maintenance activities.

7.3 Calibration of Monitoring Equipment

It is important that all environmental monitoring equipment be calibrated so that accurate readings of potential spilled or leaked materials may be detected upon inspection. Calibration frequency and procedures will be followed as per the manufacturer's recommendations. JV I will retain calibration records on site.

7.4 Trucking

All hauling vehicles will be maintained in good operating condition. Tires will be properly inflated and will have adequate tread depth as per the tire manufacture's recommendations. Trucks will not be overloaded, since overloaded trucks increase the possibility of material spillage. Truck end gates will be inspected to confirm that they close and seal properly. The tires and undercarriages of all trucks leaving the construction sites shall be visually checked by JV I

to minimize the tracking of soil and dust onto the facility's roads. Trucks entering from off site with loads will be tarped to prevent excessive dust.